Final

Feasibility Study Report for Parcel C

Hunters Point Shipyard San Francisco, California

Volume I of II

July 31, 2008

Prepared for:
Base Realignment and Closure
Program Management Office West
San Diego, California

Prepared by:
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Prepared under:
Naval Facilities Engineering Command
Contract Number N68711-03-D-5104
Contract Task Order 018

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Dear BCT members:

Enclosure (1) is the Final Feasibility Study for Parcel C, Hunters Point Shipyard, San Francisco, California, July 31, 2008 for your records. The appendices for this report are provided on CD.

Should you have any concerns with this matter, please contact Ms. Sarah Koppel at (619) 532-0962 or Mr. Keith Forman at (619) 532-0913.

Sincerely,

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By direction of the Director

Enclosure: 1. Final Feasibility for Parcel C, July 31, 2008

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PREPARED FOR:

DEPARTMENT OF THE NAVY

REVIEW AND APPROVAL

Project Manager: ______________________ Date: 7/31/08
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ACRONYMS AND ABBREVIATIONS

§	Section
§§	Sections
μg/L	Microgram per liter
ARAR	Applicable or relevant and appropriate requirement
ARIC	Area requiring institutional controls
AST	Aboveground storage tank
Basin Plan	Water Quality Control Plan for the San Francisco Bay Basin
Bay	San Francisco Bay
Bay Plan	San Francisco Bay Conservation and Development Plan
BCT	Base Realignment and Closure Cleanup Team
bgs	Below ground surface
BHC	Benzene hexachloride, also known as hexachlorocyclohexane
BRAC	Base Realignment and Closure
Cal. Code Regs.	California Code of Regulations
CAP	Corrective Action Plan
CCSF	City and County of San Francisco
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemical of concern
COEC	Chemicals of ecological concern
COPC	Chemical of potential concern
COPEC	Chemical of potential ecological concern
CSM	Conceptual site model
cy	Cubic yard
DCA	Dichloroethane
DCB	Dichlorobenzene
DCE	Dichloroethene
DNAPL	Dense nonaqueous-phase liquid
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
FS	Feasibility Study
F-WBZ	Bedrock water-bearing zone

GDGI	Groundwater data gaps investigation
gpd	Gallon per day
GRA	General response action
HHRA	Human health risk assessment
HI	Hazard index
HLA	Harding Lawson Associates
HPAL	Hunters Point ambient level
HPS	Hunters Point Shipyard
IR	Installation Restoration
ISB	In-situ bioremediation
IT Corp.	IT Corporation
ITSI	Innovative Technical Solutions, Inc.
LFR	Levine-Fricke-Recon, Inc.
LNAPL	Light nonaqueous-phase liquid
LUC	Land use control
LUC RD	Land use control remedial design
MCL	Maximum contaminant level
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
MNA	Monitored natural attenuation
MOA	Memorandum of agreement
msl	Mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and maintenance
PA	Preliminary assessment
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
PPE	Personal protective equipment
PQL	Practical quantitation limit
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal

RAO	Remedial action objective
RBC	Risk-based concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial design
RI	Remedial investigation
RMP	Risk Management Plan
RMR	Risk management review
ROD	Record of decision
RU	Remedial Unit
SA	Site assessment
SFRA	San Francisco Redevelopment Agency
SI	Site inspection
SSF	Site-specific factor
SVE	Soil vapor extraction
SVOC	Semivolatile organic compound
SWRCB	State Water Resources Control Board
TCE	Trichloroethene
TCRA	Time-critical removal action
TDS	Total dissolved solids
Tetra Tech	Tetra Tech EM Inc.
tit.	Title
TPH	Total petroleum hydrocarbons
TTPH	Sum of the fractions of total petroleum hydrocarbons
Triple A	Triple A Machine Shop, Inc.
U&A	Uribe & Associates
U.S.C.	United States Code
UST	Underground storage tank
VOC	Volatile organic compound
Water Board	San Francisco Bay Regional Water Quality Control Board
ZVI	Zero-valent iron

EXECUTIVE SUMMARY

The U.S. Department of Navy has prepared this Feasibility Study (FS) Report to address remaining contamination in soil and groundwater at Hunters Point Shipyard (HPS) Parcel C. HPS is a deactivated shipyard on the San Francisco Bay in southeastern San Francisco, California. The overall purpose of this FS Report is to provide information to support a future Proposed Plan and Record of Decision (ROD).

PURPOSE AND SCOPE

Environmental activities at Parcel C are being conducted under the Navy's Installation Restoration (IR) Program in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Parcel C is at the FS stage in the CERCLA remedial process, which typically includes the following sequence: a preliminary assessment and site inspection, remedial investigation, FS, Proposed Plan, public comment period, ROD, remedial design, remedial action, and post-construction reporting. At Parcel C, Draft and Draft Final FS Reports were developed in 1997 and 1998, respectively. Following the Draft Final FS Report, the Navy and the regulatory agencies conducted a risk management review that refined the areas for proposed response action. The Navy then conducted an interim removal action at Parcel C and a groundwater data gaps investigation. This Final FS Report is an update of the 1998 report and includes additional information from remedial activities in the intervening time.

This report includes (1) a revised human health risk assessment (HHRA) that incorporates modified protocols and procedures for conducting HHRAs at HPS agreed to by the Base Realignment and Closure (BRAC) Cleanup Team (BCT), (2) a screening evaluation of the potential of chemicals in groundwater at Parcel C to affect surface water, (3) updated remedial action objectives (RAO) that are consistent with the conveyance agreement between the United States and the San Francisco Redevelopment Agency, and (4) development and evaluation of revised remedial alternatives based on these updates.

This report addresses chemicals that are not radioactive. A radiological addendum to the FS Report is being prepared that will evaluate the radiological hazards and the necessary refinements and additions to the alternatives in this FS Report to comply with radiological applicable or relevant and appropriate requirements (ARAR). The radiological addendum will include (1) a conceptual site model for radiological contamination, including a risk evaluation; (2) RAOs for radionuclides; and (3) development and evaluation of remedial alternatives to address radiological contamination.

This executive summary discusses the background of HPS, the history and setting of Parcel C, remediation activities previously conducted, the conceptual site model, results of the revised HHRA and the screening evaluation, and the alternatives evaluation process for Parcel C.

HUNTERS POINT SHIPYARD BACKGROUND

HPS consists of 866 acres: 420 acres on land and 446 acres under water in San Francisco Bay. In 1940, the Navy obtained ownership of HPS for shipbuilding, repair, and maintenance. After World War II, activities at HPS shifted to submarine maintenance and repair. However, the Navy continued to operate carrier overhaul and ship maintenance and repair facilities through the 1960s. Other significant activities after World War II included decontamination of ships used during Operation Crossroads nuclear weapons tests; these activities occurred mainly in 1946 and 1947. HPS was also the site of the Naval Radiological Defense Laboratory from the late 1940s until 1969. Initial tasks for the laboratory included research into decontamination methods, personnel protection, and development of radiation detection instrumentation. Laboratory responsibilities grew to also include practical and applied research into the effects of radiation on living organisms and on natural and synthetic materials, in addition to continued decontamination experimentation. HPS was deactivated in 1974 and remained largely unused until 1976. Between 1976 and 1986, the Navy leased most of HPS to Triple A Machine Shop, Inc., a private ship repair company. The Navy resumed occupancy of HPS in 1987.

Because past shipyard operations left hazardous materials on site, HPS property was placed on the National Priorities List in 1989 as a Superfund site pursuant to CERCLA as amended by the Superfund Amendments and Reauthorization Act of 1986. In 1991, HPS was designated for closure under the Defense Base Closure and Realignment Act of 1990. Closure at HPS involves conducting environmental remediation and making the property available for nondefense use.

PARCEL C HISTORY AND SETTING

Parcel C is bounded by other portions of HPS, private property, and by San Francisco Bay. Historically, the dominant land use of Parcel C has been for shipping, ship repair, and office and commercial activities. According to the City and County of San Francisco's Redevelopment Plan, Parcel C will be zoned for the following reuses: research and development, mixed uses, educational and cultural, open space, and maritime/industrial uses.

Historically, Parcel C was investigated by IR site (see Figure ES-1). Parcel C originally consisted of 12 IR sites, which were evaluated during the remedial investigation. In 2002, the boundaries of Parcels B and C were redefined and IR-06 and IR-25 became part of Parcel C. Sites SI-45 (steam line system), IR-49 (fuel distribution network), and IR-50 (storm drain and sanitary sewer system) are facility-wide utility sites that traverse other sites. Site IR-51 is a facility-wide site that consists of buildings and areas that formerly housed electrical transformers. All areas and IR sites of Parcel C are addressed in this report.

Parcel C is also divided into redevelopment blocks that have been assigned redevelopment block numbers to help identify areas of Parcel C that are associated with specific planned reuses (see Figure ES-1). The redevelopment blocks were developed in the Redevelopment Plan (San Francisco Redevelopment Agency 1997). The revised HHRA and the proposed remedial alternatives are based on the redevelopment blocks. The table below lists the associated IR sites, the planned reuses, and the HHRA exposure scenario for each redevelopment block at Parcel C. The exposure scenarios are based on the planned land use descriptions in the Redevelopment Plan. For example, land zoned for research and development may include live/work spaces.

Redevelopment Block	IR Site	Planned Reuse	HHRA Exposure Scenario
10	06	Mixed Use	Residential
11	25	Mixed Use	Residential
13	58	Mixed Use	Residential
18	30, 63, Part of 29	Research and Development	Residential
20A	Part of 28	Research and Development	Residential
20B	Part of 28	Educational/Cultural	Industrial
22	Part of 28 and 64	Educational/Cultural	Industrial
23	Part of 29	Research and Development	Residential
24	Part of 28	Research and Development	Residential
25	Part of 28	Educational/Cultural	Industrial
26	Part of 29	Mixed Use	Residential
CMI-1	57	Maritime/Industrial	Industrial
COS-1	27, Parts of 64	Open Space	Recreational
COS-2	Part of 28	Open Space	Recreational
COS-3	Part of 28	Open Space	Recreational

HPS consists of relatively level lowlands that were mostly constructed by placing borrowed fill material from a variety of sources, including serpentinite bedrock from the shipyard, construction debris, and waste materials (such as used sandblast materials). Most of Parcel C is located in the lowlands, with surface elevations between 0 to 10 feet above mean sea level. No threatened or endangered species are known to inhabit Parcel C (PRC Environmental Management, Inc. and others 1996). More than 90 percent at Parcel C is covered by pavement and former industrial buildings. With little open space for flora and fauna, Parcel C is considered to have insignificant habitat value and poses an insignificant risk to terrestrial ecological receptors.

The geologic setting at Parcel C includes the following geologic units, from youngest (shallowest) to oldest (deepest): Artificial Fill, Undifferentiated Upper Sand Deposits, Bay Mud Deposits, Undifferentiated Sedimentary Deposits, and Franciscan Complex Bedrock. The hydrostratigraphic units at Parcel C are the A-aquifer, the aquitard zone, the B-aquifer, and a bedrock water-bearing zone (F-WBZ).

The groundwater conceptual model for Parcel C consists of a multi-layered aquifer system with an upper unconfined aquifer (A); a laterally noncontinuous aquitard; a second aquifer (B) consisting of an upper semiconfined bed and deeper confined beds; and weathered, fractured bedrock lateral to both the A- and B-aquifers with a deeper fractured F-WBZ. The water table is within the shallow F-WBZ across about 38 percent of Parcel C, and is within the A-aquifer across the remainder of the parcel. The F-WBZ is not considered an aquifer because of its low capacity for water production.

PARCEL C GROUNDWATER BENEFICIAL USE EVALUATION

The San Francisco Bay Regional Water Quality Control Board (Water Board) has concluded that the A-aquifer at HPS meets the exception criteria in the State Water Resources Control Board (SWRCB) Sources of Drinking Water Resolution No. 88-63 (SWRCB 1988; Water Board 2003). Therefore, the A-aquifer does not have potential for use as a drinking water source according to the state criteria. The Navy compared the A-aquifer and the B-aquifer with federal groundwater classification criteria to determine if maximum contaminant levels (MCL) are ARARs for groundwater at HPS.

The beneficial use evaluation using the U.S. Environmental Protection Agency (EPA) groundwater classification criteria found that approximately 40 percent of the shallow groundwater (within either the F-WBZ or the A-aquifer) at Parcel C is not usable for a drinking water supply or other beneficial use. The Navy evaluated the remaining 60 percent for other factors as recommended by EPA, such as the probability of use, cost of cleanup, and availability of alternative drinking water sources to determine if MCLs should be ARARs for a CERCLA cleanup (EPA 1984). Results of an evaluation of site-specific factors (SSF) show that:

- There is no historic or current use of groundwater as a water supply;
- The State of California and City and County of San Francisco will not allow the use of groundwater for drinking water because the city prohibits installation of domestic wells within city boundaries;
- Arsenic and other metals occur in A-aquifer groundwater at ambient levels that exceed MCLs, and the cost to reduce concentrations of these chemicals below MCLs would likely be prohibitive and it may be technically impracticable to do so; and
- The proximity of saline groundwater and surface water from the Bay creates a high potential for saltwater intrusion if significant quantities are produced from the aquifer.

A similar evaluation for the B-aquifer was performed, and the results of the evaluation identified the same SSFs as for the A-aquifer. The B-aquifer is present over an area of approximately 22 acres at Parcel C. Only 11 percent of the aquifer area (about 2.4 acres) meets the state criteria for classification as a potential groundwater source for drinking water, while approximately 29.5 percent of the aquifer area (about 6.5 acres) qualifies for the potential source of drinking water under the federal groundwater classification. The results of an evaluation of SSFs show the B-aquifer has a limited extent that creates severe restraints on potential production capacity. In addition, the proximity of saline groundwater and surface water from the Bay creates a high potential for saltwater intrusion if significant quantities are produced from the aquifer. Therefore, based on the cumulative components of the SSFs evaluation, the B-aquifer groundwater is not a viable potential source for drinking water and MCLs should not be designated as ARARs for B-aquifer groundwater by EPA at HPS.

The A- and B-aquifers also have potential agricultural and industrial beneficial uses. However, agricultural beneficial use for irrigation is limited by the salinity tolerance of plants (generally to total dissolved solids (TDS) concentrations of less than 700 to 1,500 milligrams per liter [mg/L]), and limited for livestock use to groundwater with TDS concentrations less than 10,000 mg/L. The City and County of San Francisco's 1997 Reuse Plan does not provide for agricultural reuse (San Francisco Redevelopment Agency 1997).

Industrial beneficial use of groundwater becomes similarly limited whenever TDS concentrations exceed approximately 8,000 mg/L. Water with higher concentrations of TDS is suitable for boiler and cooling operations at industrial facilities, but the water generally requires treatment to lower TDS concentrations (below at least 7,000 to 8,000 mg/L) prior to other uses. Other than the presence of nonaqueous-phase liquids, the presence of dissolved chemicals does not impede the industrial use of highly saline groundwater (exceeding 10,000 mg/L of TDS).

The Navy has accepted the substantive provisions of SWRCB Res. No. 88-63 as a State ARAR. The Navy has applied these substantive provisions to the B aquifer and bedrock water bearing zone (F WBZ) across Parcel C at HPS and determined that this groundwater is not a source of municipal and domestic drinking water supply. In a letter dated July 29, 2008, the Water Board stated that they concurred with the Navy's determination for the B-aquifer in the central area of Parcel C, and that they concurred with the inclusion of the upper weathered residuum of the bedrock with the A- and B-aquifer. The Water Board disagrees with the Navy's determination as it applies to the deeper, unweathered bedrock and the B-aquifer in the area of Building 134 (RU-C5). The B-aquifer in the area of Building 134 will be addressed in the alternatives in this FS report.

PARCEL C REMOVAL ACTIONS AND TREATABILITY STUDIES

The Navy has conducted a number of removal actions and treatability studies at Parcel C following the remedial investigation (PRC Environmental Management, Inc., Levine-Fricke-Recon, Inc., and Uribe & Associates 1997). These actions and studies reduced or eliminated certain risks to human health and ecological receptors. The key soil removal actions were exploratory excavations (International Technology Corporation 1999), followed by a time-critical removal action (Tetra Tech EM Inc. 2002a). Over 3,000 samples were collected and approximately 9,600 cubic yards of soil was excavated during these two removal actions. Treatability studies at Parcel C focused on technologies to reduce volatile organic compounds (VOC) in groundwater. Technologies evaluated were in-situ chemical oxidation at Remedial Unit (RU)-C1, zero-valent iron injection at RU-C4, and sequential anaerobic/aerobic bioremediation at RU-C5. Following these removal actions and studies, the Navy has a better understanding of site conditions and the remaining risk to human health and the environment that is addressed in this Final FS Report.

CONCEPTUAL SITE MODEL

Various sources of potential contamination in soil and groundwater at Parcel C have been identified; most of these sources relate to former industrial activities in Parcel C (see Figure ES-1).

Industrial operations, former fuel lines, and underground storage tanks (UST) are the significant sources of chemicals in soil at Parcel C. Parcel C has 28 former USTs, all of which have been either removed or closed-in-place. These former tanks stored various liquids, including boiler oil, diesel fuel, gasoline, solvents, waste oil, and brine or water. The predominant chemicals in Parcel C soil are metals, VOCs, polycyclic aromatic hydrocarbons (PAH), and petroleum-related compounds. Metals contamination is associated with the pickling operation at Building 258, the former foundry at Building 241, and with fuel additives. Metals are also associated with minerals in soil; these are ubiquitous across the site. PAHs and petroleum-related compounds are found in areas with former USTs or buildings where industrial operations were housed. VOC contamination in soil is associated with solvent use for industrial processes; VOC contamination in soil is generally located in areas where VOCs are found in groundwater. Semivolatile organic compounds (SVOC), other than PAHs; pesticides; and polychlorinated biphenyls (PCB) were detected in localized areas in Parcel C soil.

The sources of contamination in groundwater have been detected at four RUs, referred to as RU-C1, RU-C2, RU-C4, and RU-C5. The sources include dip tanks, sumps, former paint spray and cleaning rooms, industrial machining, USTs, solvent tanks, a pickling and degreasing area, floor drains and sewer lines, a former tank farm, and a former oil/water separator.

The predominant chemicals present in Parcel C groundwater are VOCs, primarily tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, and vinyl chloride. Discrete VOC groundwater plumes have been identified at Parcel C in each of the RUs, and these VOC plumes can be traced back to one of the sources identified above. Dense nonaqueous-phase liquid has historically been detected at RU-C5. Viscous light nonaqueous-phase liquid is present at one well at RU-C1. Areas of concern for metals also have been identified in groundwater at RU-C1 (chromium VI and zinc) and RU-C5 (chromium VI) at Parcel C.

The release mechanism for VOC and fuel-related contamination to soil and groundwater is spills and releases from the tanks, sumps, drains, former equipment, and piping, including potential leaks from storm drain lines. The widespread areas of contamination are related to the multiple sources at Parcel C as well as the complex groundwater flow.

Based upon the types of chemicals and the media in which they are present at Parcel C, the following mechanisms for chemical transport have been identified for Parcel C:

- Volatilization of VOCs from soil and groundwater
- Transport of chemicals in soil by wind

- Leaching of chemicals from soil into groundwater

- Transport of metals in groundwater, with discharge to the Bay, and exposure of marine organisms

- Ingestion of homegrown produce

The following exposure routes for chemicals have been identified at HPS:

- Ingestion of metals, VOCs, SVOCs, pesticides, and PCBs in soil

- Dermal contact with metals, VOCs, and PAHs in groundwater or metals, VOCs, SVOCs, pesticides, and PCBs in soil

- Inhalation of VOCs

Potential receptors include human populations, which may include residents, workers, or visitors at HPS, and marine organisms in the Bay.

Chemicals of Concern in Soil

Metals: Antimony, arsenic, cadmium, copper, iron, lead, manganese, mercury, nickel, thallium, vanadium, and zinc

Organic Compounds: 1,2-Dichloroethane, 1,4-DCB, 2-methylnaphthalene, 3,3'-dichlorobenzidine, aroclor-1254, Aroclor-1260, benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, dibenz(a,h)anthracene, dieldrin, gamma-BHC, heptachlor epoxide, heptachlor epoxide B, hexachlorobenzene, indeno(1,2,3-cd)pyrene, naphthalene, n-nitroso-di-n-propylamine, organic lead, tetrachloroethene, TCE, and vinyl chloride

UPDATED RISK EVALUATION SUMMARY

The HHRA presented in this report includes the data collected for soil during the 1998 to 2001 and 2004 to 2005 soil removals, as well as historic data. Soil data associated with sampling locations excavated and removed are excluded from the HHRA. In addition, data for groundwater collected up to and including December 2004 are included in the HHRA. An evaluation of risks posed by the vapor inhalation pathway is included. The HHRA also incorporates regulatory guidance and toxicological criteria that have changed since 2000. Lastly, the HHRA methodology was revised based on BCT agreements during 2003 and 2004.

At HPS, risks greater than 1E-06 (one in a million) will be addressed, as agreed with the BCT and consistent with the Conveyance Agreement for HPS (Navy and San Francisco Redevelopment Agency 2004). Additionally, the BCT has selected 1 for use as the noncancer hazard threshold for HPS. These levels correspond to the most protective level of risk under the NCP, and are more conservative than levels normally used on similar sites.

The HHRA estimated cancer risks and noncancer hazards from exposure to chemicals of potential concern in all affected environmental media for each pathway identified as potentially complete. Both total and incremental risks were evaluated for exposure to soil at Parcel C. For the total risk evaluation, all detected chemicals were included as chemicals of potential concern regardless of concentration, except for the essential nutrients calcium, magnesium, potassium, and sodium. The total risk evaluation estimates the risks posed by chemicals at the site, including any present at concentrations equal to or below ambient levels. For the incremental risk evaluation, the essential nutrients and metals with maximum detected concentrations below Hunters Point ambient levels were excluded as chemicals of potential concern in soil. The incremental risk evaluation estimates risks posed by chemicals at the site that are not at or below ambient levels. The chemicals at Parcel C determined to pose a potential unacceptable risk were identified as chemicals of concern. Potential unacceptable risk is defined as an excess lifetime cancer risk greater than 1E-06 or a segregated hazard index (HI) greater than 1 as indicated by the incremental risk evaluation.

Parcel C
Chemicals of Concern in Groundwater
(Vapor Intrusion)

1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane, 1,1-DCA, 1,2,3-Trichloropropane, 1,2,4-Trimethylbenzene, 1,2-DCB, 1,2-DCA, 1,2-DCE (total, cis and trans), 1,2-Dichloropropane, 1,3-Dichloropropene (cis and trans), 1,3,5-Trimethylbenzene, Benzene, Bromodichloromethane, Carbon Tetrachloride, Chlorobenzene, Chloroethane, Chloroform, Dibromochloromethane, Isopropylbenzene, Methylene Chloride, Naphthalene, Tetrachloroethene, TCE, Trichlorofluoromethane, and Vinyl Chloride

The total risk results for soil show that many exposure areas exceed the excess lifetime cancer risk threshold of 1E-06 or the segregated HI threshold of 1, based on planned reuse. Planned reuse for Parcel C as developed by the San Francisco Redevelopment Agency includes mixed use, research and development, educational/cultural, maritime/industrial, and open space (San Francisco Redevelopment Agency 1997). Under the incremental risk evaluation, fewer exposure areas at Parcel C exceed the cancer or noncancer risk thresholds compared to the total risk assessment because metals below ambient levels were excluded from the risk analysis. The chemicals of concern in soil at Parcel C include metals above ambient levels and organic compounds such as PAHs, PCBs, and pesticides.

Chemicals of Concern in Groundwater
(Domestic Use at RU-C5)

Metals: Antimony, Arsenic, Chromium VI, Iron, Manganese, Thallium

Organic Compounds: 1,1 Dichloroethane, 1,2,4-Trichlorobenzene, 1,2,4-Trimethylbenzene, 1,2-DCB, 1,2-DCA, 1,2 DCE, 1,2-Dichloropropane, 1,3,5-Trimethylbenzene, 1,3-Dichlorobenzene, 1,4-Dichlorobenzene, 2,4-Dimethylphenol, 2,4-Dinitrotoluene, 2-Methylnaphthalene, 2-Methylphenol, 3,4-Methylphenol, aldrin, Alpha-BHC, Benzene, Benzo(a)anthracene, Benzo(a)pyrene, bis(2-ethylhexyl)phthalate, Bromodichloromethane, Carbazole, Chlorobenzene, Chloroethane, Chloroform, Chrysene, cis-1,2-Dichloroethene, Dibenzofuran, Dieldrin, Heptachlor epoxide, Heptachlor Epoxide A, Hexachloroethane, Methylene Chloride, Naphthalene, Pentachlorophenol Tetrachloroethene, Trans 1,2-Dichloroethene, TCE, Trichlorofluoromethane, and Vinyl Chloride

The results of the HHRA for groundwater show that the risk from exposure to A-aquifer groundwater via vapor intrusion exceeds the excess lifetime cancer risk threshold of 1E-06 in several areas at Parcel C. The chemicals of concern in groundwater from the vapor intrusion pathway include chlorinated and nonchlorinated hydrocarbons. Chemicals of concern were also identified for the domestic use of the B-aquifer in the Building 134 area. No data exists for the deep bedrock water bearing zone; therefore no chemicals of concern were identified.

The screening evaluation of surface water quality evaluated potential ecological risks from exposure to groundwater as it interacts with surface water. The data evaluated indicate potential risk may be posed by chromium VI and zinc, which were identified as chemicals of ecological concern in groundwater.

FEASIBILITY STUDY PROCESS

The FS process consists of the following steps: develop RAOs, develop remediation goals, identify general response actions, identify areas that require remediation, and evaluate alternatives based on the NCP evaluation criteria at 40 *Code of Federal Regulations* 300.430(e)(9)(iii). Each of these steps is discussed below.

Develop Remedial Action Objectives

RAOs for Parcel C are medium-specific goals that were developed from the incremental risk assessment for protecting human health and the environment. Each RAO specifies (1) the chemicals of concern, (2) the exposure routes and receptors, and (3) an acceptable chemical concentration or range of concentrations for each medium of concern (such as soil and groundwater).

Remedial Action Objectives for Soil

RAOs for Parcel C soil were developed based on human receptors and results of the incremental risk assessment. The following RAO applies to Parcel C soil:

- Prevent exposure to inorganic and organic chemicals in soil above the remediation goals developed based on the HHRA for carcinogens or noncarcinogens for the following exposure pathways:
  - Ingestion of, outdoor inhalation of, and dermal exposure to soil from 0 to 10 feet below ground surface by residents in areas zoned for research and development or mixed use reuse
  - Ingestion of homegrown produce by residents in areas zoned for research and development or mixed use reuse
  - Ingestion of, outdoor inhalation of, and dermal exposure to soil from 0 to10 feet below ground surface by industrial workers in areas zoned for educational/cultural and maritime/industrial reuse
  - Ingestion of, outdoor inhalation of, and dermal exposure to soil from 0 to 2 feet below ground surface by recreational users in areas zoned for open space reuse
  - Ingestion, outdoor inhalation of, and dermal exposure to soil from 0 to 10 feet below ground surface by construction workers in all areas

- Prevent exposure to VOCs in soil gas at concentrations that would pose unacceptable risk via indoor air inhalation of vapors. Remediation goals for soil gas will be established during the RD.

Remedial Action Objectives for Groundwater

RAOs for Parcel C groundwater were developed based on (1) human health risks through inhalation of VOCs in indoor air (vapor intrusion) from the A-aquifer, (2) human health risks via domestic use pathway from the B-aquifer at RU-C5, (3) human health risks to construction workers from dermal exposure and inhalation from the A-aquifer, and (4) the potential migration of contaminated groundwater into the Bay that could affect surface water.

For the vapor inhalation pathway in groundwater and for the construction worker scenario for exposure to groundwater, institutional controls will likely be applied to prevent or minimize exposure until concentrations decrease to an acceptable level of risk. Therefore, values were developed to indicate concentrations in groundwater where institutional controls are no longer required. These values are referred to as "institutional control termination goals" rather than remediation goals.

The following RAOs apply to groundwater at Parcel C for protection of human health:

- Prevent or minimize exposure to VOCs in the A-aquifer at concentrations exceeding institutional control termination goals via indoor inhalation of vapors from groundwater.

- Prevent or minimize exposure to chemicals of concern in the B-aquifer at RU-C5 at concentrations exceeding remedial goals via the domestic use pathway unless or until the Department of Navy determines that this aquifer is not a municipal or domestic drinking water supply pursuant to the substantive criteria of SWRCB Resolution 88-63.

- Prevent or minimize exposure to VOCs in A-aquifer groundwater from dermal exposure and inhalation of vapors from groundwater by construction workers above institutional control termination goals.

The goals for groundwater are those concentrations that define when institutional controls are no longer required. Therefore, these goals are referred to as "institutional controls termination goals," rather than remediation goals.

The following RAOs apply to groundwater at Parcel C for protection of the environment:

- Prevent or minimize migration of chromium VI and zinc to prevent discharge that would result in concentrations of chromium VI above 50 micrograms per liter (μg/L) and zinc at concentrations above 81 μg/L in the Bay.

Plume specific trigger levels will be used as groundwater monitoring criteria to support the groundwater RAOs at RU-C1 and RU-C5.

Develop Remediation Goals

Exposure scenario-specific risk-based concentrations were calculated based on a target cancer risk level of 1E-06 and target noncancer HI of 1, consistent with the exposure pathways and assumptions used in the HHRA to assess risks. The selection of these target risk levels is based on agreements with the BCT and the Conveyance Agreement for Parcel C (Navy and San Francisco Redevelopment Agency 2004). Remediation goals were developed for each chemical of concern based on the risk-based concentrations, chemical-specific ARARs, the laboratory practical quantitation limit, and the ambient level for the chemical of concern, if one was established. Goals were derived for both soil and groundwater and for chemical of concerns identified from both the HHRA and surface water quality screening evaluation. As discussed above, the goals for the vapor inhalation pathway in groundwater and for the construction worker scenario for exposure to groundwater are referred to as "institutional control termination goals" rather than remediation goals.

Identify General Response Actions

General response actions are responses or remedies intended to meet remedial action objectives. General response actions identified for soil and groundwater at Parcel C include no action, institutional controls, removal and disposal, treatment, and containment. Process options were initially screened and then analyzed in detail to select the technologies and processes that are appropriate to address chemicals of concern at Parcel C. Based on this screening and evaluation, soil and sediment treatment technologies and groundwater removal and containment technologies were eliminated from further consideration. Technologies and process options that were retained were available for use during development of the remedial alternatives.

Develop Remedial Alternatives

Remedial alternatives were developed using combinations of the retained process options to meet remedial action objectives. Remedial alternatives were derived using experience and engineering judgment that formulated the process options into the most plausible site-specific response actions. The soil and groundwater alternatives developed for further analysis are presented below.

<u>Soil Alternatives</u>

- **Alternative S-1: No Action.** For this alternative, no response action would be taken. Soil would be left in place without implementing any response actions. The no-action response is retained throughout the evaluation process as required by the NCP to provide a baseline for comparison with other alternatives.

- **Alternative S-2: Institutional Controls and Maintained Landscaping.** Alternative S-2 consists of institutional controls and maintained landscaping that together would meet all ARARs and RAOs. The institutional controls include access restrictions and covenants to restrict use of property that would be implemented parcel-wide for all of the redevelopment blocks. The maintained landscaping would prevent potential exposure to asbestos (that may be present in surface soil and transported by wind erosion) that would not be addressed by institutional controls alone.

- **Alternative S-3: Excavation, Disposal, Institutional Controls, and Maintained Landscaping.** Alternative S-3 consists of institutional controls, and maintained landscaping similar to Alternative S-2 along with soil excavation and off-site disposal. Alternative S-3 contains the same maintained landscaping components that are discussed with Alternative S-2. Areas with elevated concentrations of lead, mercury, zinc, and organic chemicals would be excavated to reduce the concentrations of these chemicals to meet remediation goals. Excavations for arsenic are included where the concentrations significantly exceed the Hunters Point ambient level, and are outside of concentration ranges found in naturally occurring metals in the same geologic formations in the San Francisco area. This alternative would provide a more permanent remedy because chemicals would be removed where excavation is feasible. Parcel-wide institutional controls would still be required to reduce the risk of exposure to other chemicals of concern in soil that are not practical to remediate by excavation and disposal.

- **Alternative S-4: Covers and Institutional Controls.** Alternative S-4 consists of covers (physical barriers) to block the exposure pathway to soil chemicals and institutional controls similar to Alternatives S-2 and S-3. Covers included in this alternative include new covers where existing covers are not present. Existing covers include existing buildings, roads, parking lots, and paved areas. Institutional controls are included in this alternative for both short-term and long-term reduction of risk exposure. Institutional control provisions would be similar to those required for Alternative S-2, but would also require maintenance of the covers.

- **Alternative S-5: Excavation, Disposal, Covers, Soil Vapor Extraction, and Institutional Controls.** Alternative S-5 consists of a combination of soil excavation and off-site disposal, covers, soil vapor extraction for VOCs, and institutional controls. This alternative was developed to (1) remove and dispose of lead, mercury, zinc, and organic chemicals, as described in Alternative S-3; (2) implement and maintain block-wide covers, as described in Alternative S-4; (3) remove and treat VOCs in soil using soil vapor extraction; and (4) implement the institutional controls, as described in Alternative S-2.

Groundwater Alternatives

- **Alternative GW-1: No Action.** For this alternative, no response action would be taken for groundwater. Groundwater conditions would be left as is, without implementing any response actions. The no-action response is retained throughout the evaluation process as required by the NCP to provide a baseline for comparison with other alternatives.

- **Alternative GW-2: Institutional Controls and Long-Term Groundwater Monitoring.** Alternative GW-2 consists of institutional controls and long-term groundwater monitoring. Institutional controls are included in this alternative to effectively manage risk by preventing exposure to groundwater or indoor vapors. This alternative was developed as a method of preventing risk while still allowing for monitoring chemicals present in groundwater. Long-term monitoring would include verification of the performance of institutional controls and chemicals in groundwater. Groundwater monitoring would be used to monitor potential migration of chemicals in groundwater to confirm that groundwater discharge to the Bay will not increase contaminant levels in surface water to above acceptable levels.

- **Alternative GW-3A: In-Situ Bioremediation, Monitored Natural Attenuation, and Institutional Controls.** Alternative GW-3A is a source control alternative. Under this alternative, bioremediation would be used to reduce the mass of chemicals in the source area. Depending on the chemicals in each plume, bioremediation would include anaerobic, aerobic, or sequential anaerobic/aerobic bioremediation. The remedy would shift into the natural attenuation phase after chemicals are significantly reduced in contaminated source areas. Institutional controls would remain in effect until the chemical plumes naturally attenuate to institutional control termination goals. Institutional controls would include restrictions on groundwater use and stipulations on future construction practices for reducing the migration of vapor into new buildings.

- **Alternative GW-3B: In-Situ Zero-Valent Iron Reduction, Bioremediation, Monitored Natural Attenuation, and Institutional Controls.** Alternative GW-3B is a source control alternative. It is an enhancement over Alternative GW-3A and attempts to speed up the treatment of chemicals using zero-valent iron (ZVI). ZVI would target chlorinated ethenes and ethanes, which are the most predominant chemicals at Parcel C. After ZVI treatment, the remedy would shift into the bioremediation phase. Bioremediation would treat residual chemicals using aerobic, anaerobic, or sequential anaerobic/aerobic treatment similar to Alternative GW-3A. Following bioremediation, the remedy would shift into the natural attenuation phase. Institutional controls would remain in effect until the chemical plumes naturally attenuate to institutional control termination goals. Institutional controls would include restrictions on groundwater use and stipulations on future construction practices for reducing the migration of vapor into new buildings.

- **Alternative GW-4: In-Situ Zero-Valent Iron Reduction, Plume-Wide Bioremediation, Monitored Natural Attenuation, and Institutional Controls.** Alternative GW-4 is an enhancement over Alternative GW-3A. Under this alternative, the entire plume would be actively remediated, which would reduce chemicals more quickly than Alternative GW-3A. This alternative would use ZVI to reduce chemicals in contaminated source areas, then follow-up with bioremediation of the remaining plume. Similar to Alternative GW-3B, bioremediation would include aerobic, anaerobic, or sequential anaerobic/aerobic treatment. After bioremediation endpoints are met, the remedy would shift into the natural attenuation phase. Institutional controls would remain in effect until the chemical plumes naturally attenuate to institutional control termination goals. Institutional controls would include restrictions on groundwater use and stipulations on future construction practices for reducing the migration of vapor into new buildings.

EVALUATION OF ALTERNATIVES BASED ON NATIONAL OIL AND HAZARDOUS SUBSTANCES POLLUTION CONTINGENCY PLAN EVALUATION CRITERIA

Each remedial alternative developed in the FS was evaluated in comparison to the two threshold and five balancing NCP evaluation criteria (see adjacent box). Comparison to the two modifying criteria of state and community acceptance will be included in the Proposed Plan after comments are received from the regulatory agencies and the public. A comparative analysis was also completed to evaluate the relative performance of the five soil and three groundwater remedial alternatives developed for Parcel C.

NCP Evaluation Criteria

Threshold Criteria:

- Overall protection of human health and the environment
- Compliance with ARARs

Balancing Criteria:

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost

Modifying Criteria:

- State agency acceptance
- Community acceptance

EVALUATION RESULTS FOR SOIL AND GROUNDWATER ALTERNATIVES

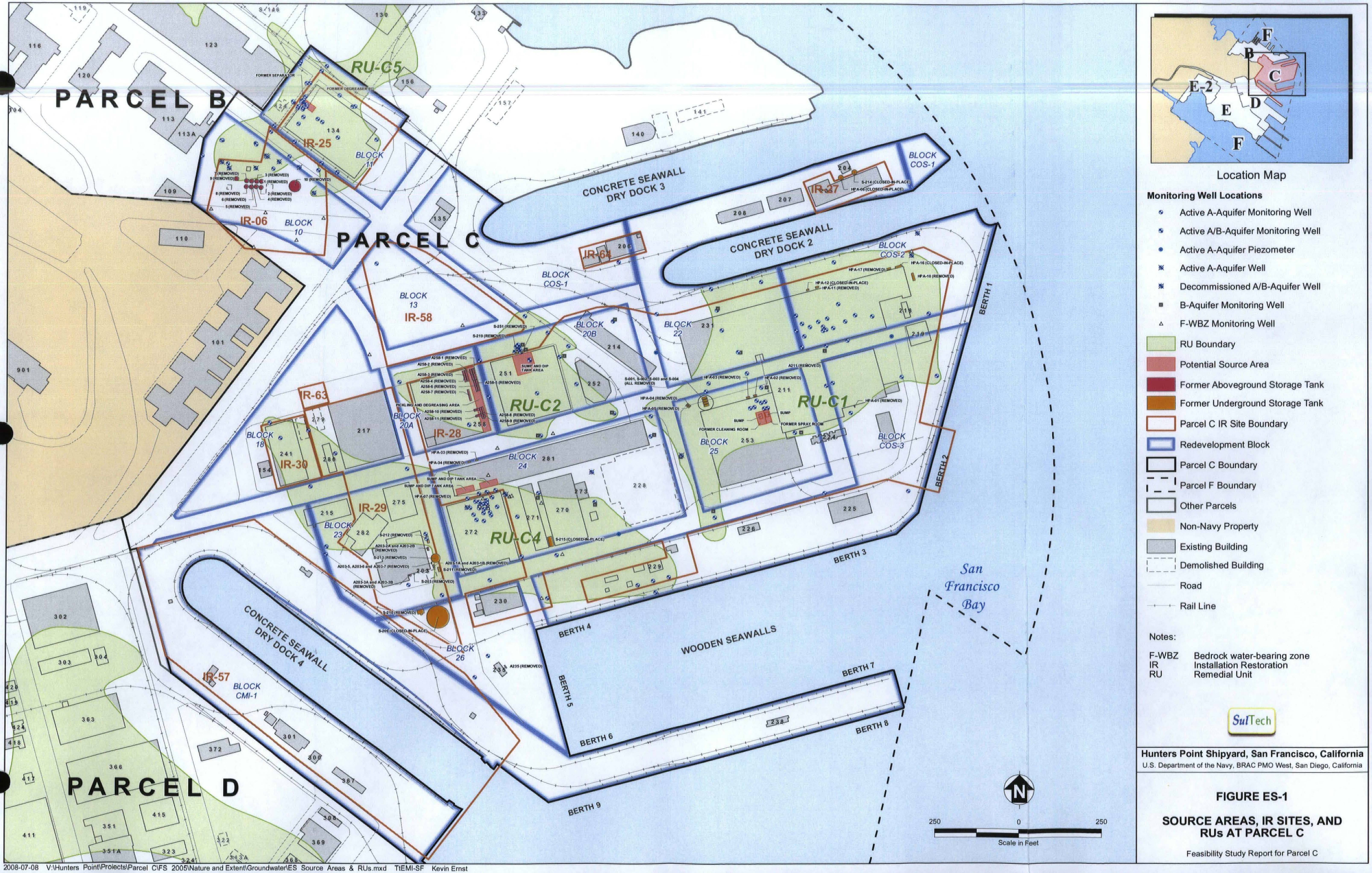
An overall rating was assigned to each alternative. Alternative S-5 at $25 million is rated excellent overall for the two threshold and five balancing NCP evaluation criteria. Alternative S-5 is the most protective, with both excavation and covers plus soil vapor extraction, although it has the highest cost. Alternative S-2 at $2 million, rated poor overall, is easiest to implement. Alternative S-3, rated good overall, is more protective than Alternative S-2 because chemicals would be removed, although it is more expensive ($16 million). Alternative S-4 at $7 million, rated very good overall, is more protective than Alternatives S-2 or S-3 and less expensive than Alternative S-3. Alternative S-1 is not acceptable.

Alternative GW-3B, rated excellent, has the highest overall ratings. The treatment effectively reduces risks to human health and environment although it has a high cost at $28 million. Alternative GW-3A, rated very good, also provides treatment at a slightly lower cost ($22 million) but is less flexible. Alternative GW-3A is more cost-effective, while Alternative GW-3B is more effective in the short term and is more implementable. Alternative GW-4, rated very good, is considerably more expensive ($48 million) than the other groundwater alternatives but provides faster remediation. Alternative GW-2, rated not acceptable, does not meet ARARs for drinking water at RU-C5, is not effective at reducing concentrations within a reasonable timeframe or reducing the potential for migration of COECs to the Bay. Alternative GW-1 is not acceptable.

Table ES-1 summarizes each alternative's rating under the seven evaluation criteria. The ranking categories used in Table ES-1 and in the discussion of the alternatives are (1) protective or not protective, and meets applicable or relevant and appropriate requirements or does not meet ARARs, for the two threshold criteria; and (2) excellent, very good, good, poor, and not acceptable for the five balancing criteria. Tables ES-2 and ES-3 summarize the comparative analysis of the balancing criteria for the soil and groundwater alternatives, respectively.

ES - FIGURES

FIGURE



Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE ES-1

SOURCE AREAS, IR SITES, AND RUs AT PARCEL C

Feasibility Study Report for Parcel C

2008-07-08 V:\Hunters Point\Projects\Parcel C\FS 2005\Nature and Extent\Groundwater\ES Source Areas & RUs.mxd TtEMI-SF Kevin Ernst

ES - TABLES

TABLES

Table ES-1: Rating of Remedial Alternatives for Soil and Groundwater

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

	Overall Protection of Human Heath and the Environment[a]	Compliance with ARARs[a]	Long-Term Effectiveness and Permanence	Reduction of Mobility, Toxicity, or Volume through Treatment	Short-Term Effectiveness	Implementability	Cost ($ Million)	Overall Rating by Alternative
SOIL ALTERNATIVES								
Alternative S-1: No Action	Not Protective	Not Applicable	Not acceptable	Poor	Very Good	Excellent	0	Not acceptable
Alternative S-2: Institutional Controls and Maintained Landscaping	Protective	Meets ARARs	Good	Poor	Good	Poor	$2	Poor
Alternative S-3: Excavation, Disposal, Institutional Controls, and Maintained Landscaping	Protective	Meets ARARs	Good	Poor	Good	Very Good	$16	Good
Alternative S-4: Covers and Institutional Controls	Protective	Meets ARARs	Very Good	Poor	Very Good	Very Good	$7	Very Good
Alternative S-5: Excavation, Disposal, Covers, Soil Vapor Extraction, and Institutional Controls	Protective	Meets ARARs	Excellent	Good	Very Good	Good	$25	Excellent
GROUNDWATER ALTERNATIVES								
Alternative GW-1: No Action	Not Protective	Not Applicable	Not acceptable	Poor	Very Good	Excellent	0	Not acceptable
Alternative GW-2: Institutional Controls and Long-Term Groundwater Monitoring	Not Protective	Does Not Meet ARARs	Poor	Poor	Excellent	Excellent	$13	Not acceptable
Alternative GW-3A: In-Situ Bioremediation, Monitored Natural Attenuation, and Institutional Controls	Protective	Meets ARARs	Excellent	Very Good	Very Good	Good	$22	Very Good
Alternative GW-3B: In-Situ Zero-Valent Iron Reduction, Bioremediation, Monitored Natural Attenuation, and Institutional Controls	Protective	Meets ARARs	Excellent	Excellent	Excellent	Very Good	$28	Excellent
Alternative GW-4: In-Situ Zero-Valent Iron Reduction, Plume-Wide Bioremediation, Monitored Natural Attenuation, and Institutional Controls	Protective	Meets ARARs	Excellent	Excellent	Very Good	Good	$48	Very Good

Legend:

- Not acceptable
- Poor
- Good
- Very Good
- Excellent

Notes:

a Overall protection of human health and the environment and compliance with ARARs are threshold criteria and alternatives are judged as either meeting or not meeting the criteria.

ARAR Applicable or relevant and appropriate requirement

TABLE ES-2: SUMMARY OF COMPARATIVE ANALYSIS OF SOIL ALTERNATIVES
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Soil Alternative	Long-Term Effectiveness and Permanence	Reduction of Mobility, Toxicity, or Volume through Treatment	Short-Term Effectiveness	Implementability	Cost [1]
	Parameters considered: • Magnitude of residual risks • Adequacy and reliability of release controls	Parameters considered: • Anticipated capability to reduce toxicity, mobility, or volume of chemicals	Parameters considered: • Exposure of the community during implementation • Exposure of the workers during construction • Environmental effects • Time required to achieve RAOs	Parameters considered: • Technical and administrative feasibility of implementing an alternative • Availability of required resources and materials • Ability to construct the technology • Reliability of the technology • Monitoring considerations • Availability of equipment and specialists	Parameters considered: • Capital costs • Operations and maintenance costs • Costs for long-term monitoring
Alternative S-1 – No Action	Not Acceptable	Poor	Very Good	Excellent	Excellent
	Not effective and permanent because residual soils contamination above remediation goals is not addressed; no engineering controls to prevent exposure and no long-term management measures implemented.	Does not reduce the mobility, toxicity, or volume of chemicals in soil through treatment.	No short-term risk because no active remediation activities are proposed.	Readily implementable.	No costs incurred.
Alternative S-2 – ICs and Maintained Landscaping	Good	Poor	Good	Poor	Excellent
	Effective in the long-term because ICs prevent complete exposure pathway to all potential human receptors; adequacy and reliability depend on maintenance of engineering controls and degree of enforcement.	Does not reduce the mobility, toxicity, or volume of chemicals in soil through treatment.	Community protected; engineering controls constructed and maintained with minimal exposure to workers; 6 months to implement and effects of implementation nearly immediate.	Minimal construction and maintenance required to implement ICs and maintained landscaping portions; administrative aspect straightforward. Likely difficult to implement over the long term because of the restricted use of the site.	$2 million
Alternative S-3 – Excavation, Disposal, ICs, and Maintained Landscaping	Good	Poor	Good	Very Good	Very Good
	Effective in the long-term in areas where COC-contaminated soil is removed and disposed of off site; areas with metals above remediation goals addressed with ICs have very good adequacy and reliability.	Does not reduce the mobility, toxicity, or volume of chemicals in soil through treatment.	Containment controls protect community and workers; increased construction traffic adds risk to the community; best management practices for construction ensure construction effects are limited; estimated time to implement is 2 years.	Technically feasible although volume of excavations is significant; easily implemented because technologies are conventional and commonplace; ICs easy to implement administratively.	$16 million
Alternative S-4 – Covers and ICs	Very Good	Poor	Very Good	Very Good	Very Good
	Effective in the long-term because covering soils reduces risks and cuts off exposure pathways; adequacy and reliability of ICs depend on monitoring and maintaining covers.	Does not reduce the mobility, toxicity, or volume of chemicals in soil through treatment.	Increased construction traffic may cause risk to community; constructing covers may cause risk to workers but less risk than excavation; environmental effects would be reduced through implementation of best management work practices; activities likely to be completed in 2 years.	Technically feasible and easily implemented because technologies are conventional and commonplace; ICs are easy to implement administratively.	$7 million

TABLE ES-2: SUMMARY OF COMPARATIVE ANALYSIS OF SOIL ALTERNATIVES (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Soil Alternative	Long-Term Effectiveness and Permanence	Reduction of Mobility, Toxicity, or Volume through Treatment	Short-Term Effectiveness	Implementability	Cost [1]
Alternative S-5 – Excavation, Disposal, Covers, SVE, and ICs	Excellent	Good	Very Good	Good	Good
	Effective in the long-term because potential unacceptable risk from soils with lead, zinc, and organic COCs are removed and residual risks from other COCs are reduced through covers; exposure pathways prevented; adequacy and reliability of ICs depend on monitoring and maintenance of covers and other land use and deed restrictions.	With the exception of SVE, does not reduce the mobility, toxicity, or volume of chemicals in soil through active remediation.	Risk to community may occur by excavating and transporting contaminated soils but minimized with containment controls; increased construction adds to risk to community; risk to workers would require mitigation; adverse environmental effects may occur from fugitive dust; environmental effect from covers will be low; time to complete is approximately 2 years.	Technically feasible although significant volume of activity; easily implemented because technologies are conventional and commonplace; ICs easy to implement administratively.	$25 million

Notes:

1 Based on net present value

COC Chemical of concern
IC Institutional control
RAO Remedial action objectives
SVE Soil vapor extraction

TABLE ES-3: SUMMARY OF COMPARATIVE ANALYSIS OF GROUNDWATER ALTERNATIVES

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Groundwater Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Cost *
	Parameters considered: • Magnitude of residual risks • Adequacy and reliability of release controls	Parameters considered: • Anticipated capability to reduce toxicity, mobility, or volume of chemicals	Parameters considered: • Exposure of the community during implementation • Exposure of the workers during construction • Environmental effects • Time required to achieve RAOs	Parameters considered: • Technical and administrative feasibility of implementing an alternative • Availability of required resources and materials • Ability to construct the technology • Reliability of the technology • Monitoring considerations • Availability of equipment and specialists	Parameters considered: • Capital costs • Operations and maintenance costs • Costs for groundwater monitoring
Alternative GW-1 – No Action	Not Acceptable	Poor	Very Good	Excellent	Excellent
	Unacceptable risk to human health; poor adequacy and reliability of controls.	Does not reduce the mobility, toxicity, or volume of chemicals in groundwater through treatment.	No short-term risk because no active remediation activities are proposed.	Readily implementable.	No costs incurred.
Alternative GW-2 – ICs and Long-Term Groundwater Monitoring	Poor	Poor	Excellent	Excellent	Very Good
	Reduces risk by eliminating exposure pathway to potential human receptors; vapor entry through building slabs and utility lines mitigated through ICs specifying future construction practices. Does not reduce concentrations of COCs or COECs; adequacy and reliability depend on maintenance of access restrictions and the reliability and adequacy of long-term monitoring program. May not reduce potential risk to ecological receptors.	Does not reduce the mobility, toxicity, or volume of the chemical through treatment.	ICs implemented in less than 6 months; minimal risks to the community, workers, and the environment by periodic groundwater sampling for long-term monitoring for 30 years or more.	Technically and administratively feasible; long-term monitoring requires a moderate level of routinely available resources.	$11 Million
Alternative GW-3A – In-Situ Bioremediation, MNA, and ICs	Excellent	Very Good	Very Good	Good	Good
	Reduces risk by cleaning up groundwater. Eliminates exposure pathway to potential human receptors through ICs until completion of remedy; vapor entry through building slabs and utility lines mitigated through ICs specifying future construction practices; adequacy and reliability depend on maintenance and enforcement of access restrictions; includes permanent solutions not dependent on ICs in the long term.	Toxicity and volume of COCs and COECs reduced; risk of mobility addressed.	No health risks to community; minimal risk to workers during groundwater sampling; some potential for construction-related injuries during remediation; minor environmental effects; active treatment implemented in 20 years or less; groundwater monitoring continues for 30 years.	Injection treatment is feasible; treatment requires moderate level of resources.	$22 Million

TABLE ES-3: SUMMARY OF COMPARATIVE ANALYSIS OF GROUNDWATER ALTERNATIVES (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Groundwater Alternative	Long-Term Effectiveness and Permanence	Reduction of Toxicity, Mobility, or Volume through Treatment	Short-Term Effectiveness	Implementability	Cost *
Alternative GW-3B – In-Situ ZVI Reduction, Bioremediation, MNA, and ICs	Excellent	Excellent	Excellent	Very Good	Good
	Reduces risk by cleaning up groundwater. Eliminates exposure pathway to potential human receptors through ICs until completion of remedy; vapor entry through building slabs and utility lines mitigated through ICs specifying future construction practices; adequacy and reliability depend on maintenance and enforcement of access restrictions; includes permanent solutions not dependent on ICs in the long term.	Toxicity and volume of COCs and COECs reduced at the source; risk of mobility addressed; less time required than for Alternative GW-3A, and may be more effective.	No health risks to community; minimal risk to workers during groundwater sampling; some potential for construction-related injuries during remediation; minor environmental effects; active treatment implemented in 15 years or less; groundwater monitoring continues for 30 years.	Injection treatment is feasible; treatment requires moderate level of resources; more flexible than Alternative GW-3A because two approaches used to treat chemicals, but involves greater effort; Faster thanGW-3A.	$28 Million
Alternative GW-4 - In-Situ ZVI Reduction, Plume-Wide Bioremediation, MNA, and ICs	Excellent	Excellent	Very Good	Good	Good
	Same as Alternative GW-3B.	Toxicity and volume of COCs and COECs reduced throughout the plume; risk of mobility addressed.	Similar to Alternative GW-3B, but slightly higher potential for construction-related injuries. Active treatment implemented in 15 years or less; monitoring continues for 25 years.	Similar to Alternative GW-3B, but involves greater effort. MNA period may be shorter than GW-3B.	$45 Million

Notes:

*	Based on net present value
COC	Chemical of concern
COEC	Chemical of ecological concern
IC	Institutional control
MNA	Monitored natural attenuation
RAO	Remedial action objective
ZVI	Zero valent iron

SECTION 1

1.0 INTRODUCTION

This report summarizes the results of a Feasibility Study (FS) performed for Parcel C at Hunters Point Shipyard (HPS) in San Francisco, California (see Figure 1-1). The overall objective of this report is to provide information to support a future Proposed Plan that would align the final remedy for Parcel C with its planned reuse.

In 1989, the U.S. Environmental Protection Agency (EPA) identified HPS as a National Priorities List (NPL) site. As a result, the U.S. Department of the Navy is conducting investigations in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Title 42 United States Code [U.S.C.] Sections [§§] 9601-9675) at a number of sites at HPS.

This FS Report is part of ongoing efforts by the Navy to address contamination in Parcel C at HPS in accordance with CERCLA. The FS is a mechanism for developing, screening, and evaluating alternatives for remedial actions to address risk identified during a remedial investigation (RI) under the CERCLA process. In addition, the FS documents risk management decisions made by the stakeholders. As the lead agency, the Navy is working with EPA Region 9 and the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) and the San Francisco Bay Regional Water Quality Control Board (Water Board) to develop and implement the remedial alternatives in this report. The Navy coordinates activities at HPS with the regulatory agencies under the terms of a Federal Facility Agreement (FFA). The FFA was prepared in 1990, revised in 1991, and signed by representatives of the Navy, EPA, DTSC, and the Water Board in 1992 (EPA 1990b). The Navy, EPA, DTSC, and Water Board representatives are collectively referred to as the Base Realignment and Closure (BRAC) Cleanup Team (BCT) for HPS.

Previous Draft and Draft Final FS Reports for Parcel C were prepared in 1997 and 1998; however, based on comments received during the public review period and concerns from the regulatory agencies, the Navy decided to conduct interim remedial actions, collect additional data, and perform further data evaluations before finalizing the FS Report. This Final FS Report for Parcel C includes (1) an update to the site characterization, (2) a revised baseline human health risk assessment (HHRA) and an evaluation of potential environmental effects on the San Francisco Bay (Bay), (3) updated remedial action objectives (RAO) that reflect the Conveyance Agreement between the Navy and the San Francisco Redevelopment Agency (SFRA) (2004), and (4) development and evaluation of revised remedial alternatives based on these updates.

Parcel C is one of seven parcels identified at HPS: A, B, C, D, E, E-2, and F. The Navy divided HPS into separate parcels to conduct RIs and FSs, and to expedite remedial actions in support of transferring the property. In 1992, the Navy divided HPS into geographic parcels, A through E. To address regulatory agency concerns about possible contamination of the Bay, the offshore portion of HPS was identified as Parcel F in 1996. In September 2004, the landfill area in Parcel E was separated and identified as Parcel E-2 to aid the transfer of Parcel E. In December 2004, the Navy transferred Parcel A to the SFRA; the remaining six parcels are shown on Figure 1-2. Parcel C has undergone several boundary changes: in 2002, Installation Restoration (IR) Sites 06 and 25 were transferred from Parcel B to Parcel C; and in March 2004, a portion of Parcel A was transferred to Parcel C. This Final FS Report addresses the area within the Parcel C boundary as redefined in March 2004.

Section 1.1 summarizes the purpose and scope of this Final FS Report. The organization of this Final FS Report is presented in Section 1.2.

1.1 PURPOSE AND SCOPE

The purpose of this Final FS Report for Parcel C is to update the data and site characterization information available since the 1998 FS Report, including (1) refining the conceptual site model (CSM); (2) reevaluating the risks posed by chemicals in soil and groundwater at Parcel C using the updated data and the revised methodology; (3) refining the RAOs to be consistent with the Conveyance Agreement signed in March 2004 (Navy and SFRA 2004); and (4) reevaluating remedial alternatives applicable at Parcel C. The BCT will use this Final FS Report to assist in evaluating the appropriate remedial actions for Parcel C to allow transfer of the property to the city.

This report was prepared in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and EPA guidance, "Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA" (EPA 1988). The NCP states that remediation should be accomplished through the use of cost-effective remedial alternatives that effectively lessen threats to and provide adequate protection of public health, welfare, and the environment (EPA 1990a). Remedial alternatives that are protective of human health and the environment are evaluated in this Final FS Report.

During the FS process, remedial alternatives are developed by incorporating media-specific technologies into cleanup alternatives. The process consists of the following general steps:

- Develop RAOs specifying the chemicals and media of concern, exposure pathways, and remediation goals that permit a range of treatment and containment alternatives to be developed. The RAOs are developed based on chemical-specific applicable or relevant and appropriate requirements (ARAR) and results of the HHRA.

- Develop remediation goals based on the RAOs, the results of the risk assessment and surface water evaluation, and the ARARs.

- Develop general response actions (GRA) for each medium defining containment, removal, treatment, disposal, or other actions, singly or in combination that may be taken to satisfy the RAOs for the site. Identify volumes or areas to which GRAs would apply.

- Identify and screen remedial technologies for each GRA to determine which technologies could be implemented technically and cost effectively, at the site.

- Identify and screen process options for each remedial technology that are most appropriate for use at the site.

- Develop remedial alternatives, by combining retained process options.

- Evaluate the alternatives against the evaluation criteria established by the NCP and against each other.

This Final FS Report addresses CERCLA-regulated chemicals. The HHRA in this report addresses chemicals that are not radioactive. As a result, a radiological addendum to the FS Report is being prepared to evaluate remedial alternatives for radiological contamination. The radiological addendum will evaluate alternatives to address the radiologically impacted sites identified in the Historical Radiological Assessment (Navy 2004b). The following buildings at Parcel C were designated as radiologically impacted: Buildings 203, 205 and discharge tunnel, 211, 214, 224, 241, 253, 271, and 272. The radiological addendum will include the following components:

- Develop a CSM for radiological contamination, including a risk evaluation

- Identify radionuclides of concern

- Develop RAOs for radionuclides

- Identify potential ARARs for radionuclides

- Evaluate additional costs for soil and groundwater alternatives to include radionuclides

- Develop and identify remedial alternatives for relevant media for radiological contamination, such as structures

- Evaluate alternatives to NCP criteria

Both chemical and radiological contaminants will be addressed together in the proposed plan.

1.2 REPORT ORGANIZATION

This report has seven sections, including this introduction. After this introduction, the remaining six sections present updated site characterization and risk assessment and the results of the FS process for Parcel C, as summarized below.

- **Section 2.0 – Site Characterization,** updates site characterization information for HPS and Parcel C, including (1) the history of HPS, (2) the facility setting of HPS, (3) site sources and the nature and extent of contamination in soil and groundwater, and (4) the CSM. Data presented are from the RI, interim removal action data, and additional groundwater investigation and monitoring performed since the 1998 FS Report. The site characterization update presents the nature and extent of the chemicals of concern (COC) identified in soil and groundwater based on the revised HHRA and environmental evaluation for Parcel C.

- **Section 3.0 – Updated Risk Evaluation Summary,** summarizes the human health risks based on the soil and groundwater conditions and planned future land uses and the evaluation of potential effects to the Bay from chemicals detected in groundwater.

- **Section 4.0 – Remedial Action Objectives, Applicable or Relevant and Appropriate Requirements, General Response Actions, and Process Options,** presents RAOs, remediation goals, and ARARs for Parcel C based on the site characterization and revised HHRA results. GRAs are then identified that address the RAOs and ARARs. Process options associated with each GRA are screened for technical effectiveness, implementability, and cost.

- **Section 5.0 – Development and Description of Remedial Alternatives,** presents a detailed description of the remedial alternatives that were developed based on the retained process options in Section 4.0 that will satisfy the RAOs. Process options recommended for consideration are assembled, singularly or in combination, to create the remedial alternatives.

- **Section 6.0 – Detailed and Comparative Analysis of Remedial Alternatives,** presents the evaluation of each remedial alternative developed in Section 5.0 against the NCP's evaluation criteria. The alternatives are then compared with each other to evaluate their relative advantages and disadvantages with respect to the nine evaluation criteria.

- **Section 7.0 – References,** presents a list of documents and supporting material used to generate this report.

In addition, supporting data, calculations, and evaluations for this Final FS Report are presented in the following appendices:

- **Appendix A – Groundwater Beneficial Use Evaluation,** presents a detailed analysis of the beneficial use of the A-aquifer, the B-aquifer, and the bedrock water-bearing zone (F-WBZ) at Parcel C to help define the appropriate exposure scenarios in the revised HHRA.

- **Appendix B – Analytical Results for Soil and Groundwater at Parcel C,** presents all Parcel C soil and groundwater data used in this Final FS Report. All historical validated soil and groundwater data are provided, along with figures detailing the sampling locations.

- **Appendix C – Revised Baseline Human Health Risk Assessment,** presents a detailed description of the risk methods and results, including figures and tables for the various exposure scenarios. Section 3.0 summarizes Appendix C.

- **Appendix D – Applicable or Relevant and Appropriate Requirements,** identifies and evaluates potential federal and State of California ARARs, and presents the Navy's determinations regarding these ARARs applicability to the alternatives in this report. The ARARs are summarized in Section 4.0.

- **Appendix E – Conceptual Groundwater Monitoring Approach,** presents the basis for and the proposed groundwater monitoring at Parcel C. The proposed monitoring approach is used as the basis for estimating costs associated with a potential future remedial action monitoring plan.

- **Appendix F – Remedial Action Alternative Cost Summary Sheets,** presents detailed costs and associated assumptions for each alternative that were used to support the evaluation of the cost criterion in Section 6.0. Appendix F includes detailed spreadsheets that provide per unit costs and quantities for each line item.

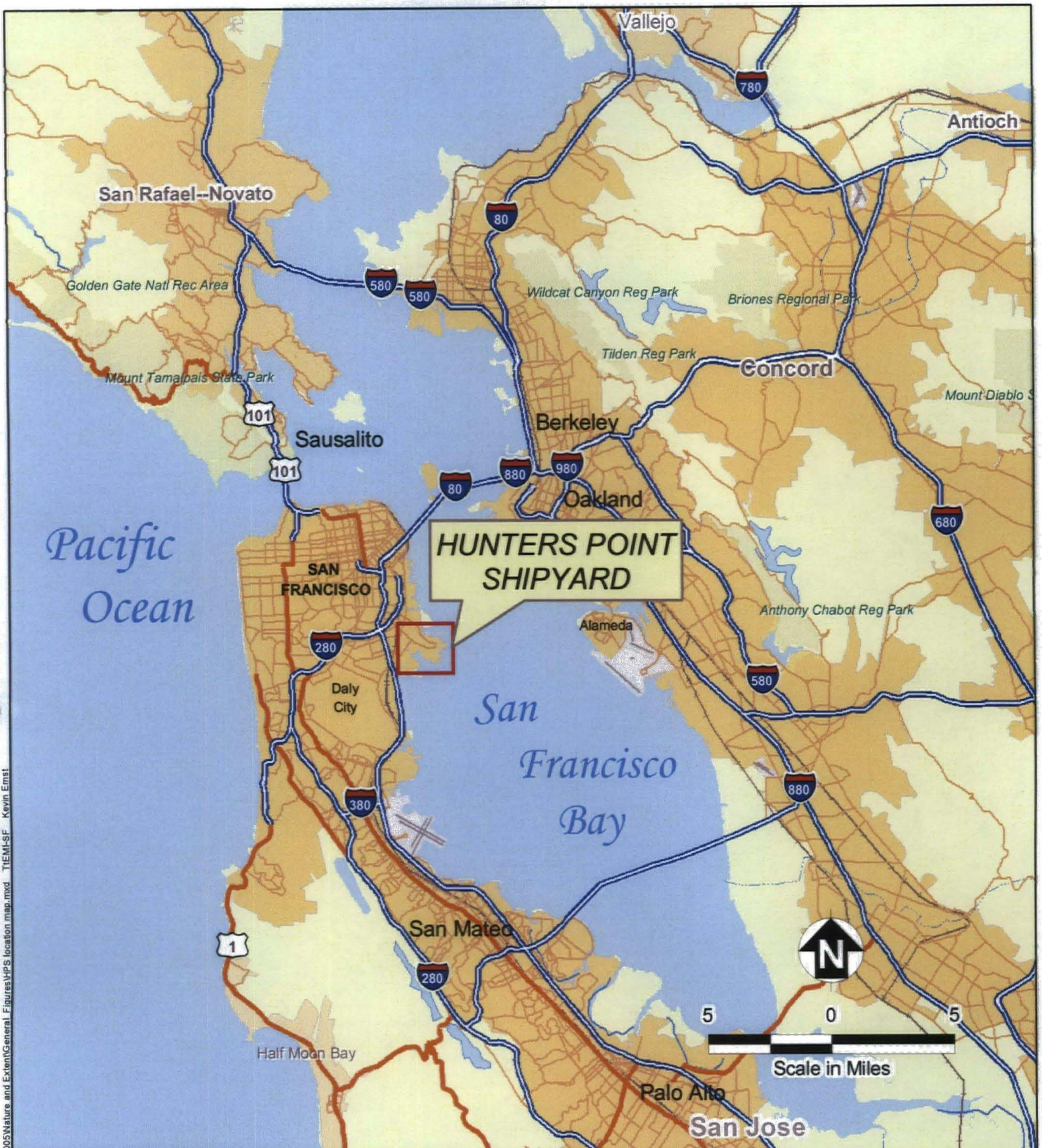
- **Appendix G – Preliminary Screening of Groundwater Effects to the San Francisco Bay at Parcel C,** presents the results of the screening evaluation to select chemicals of ecological concern (COEC) based on the potential effects to the Bay.

- **Appendix H – Trigger Levels for Groundwater Effects to the San Francisco Bay,** presents the trigger levels developed for Parcel C to protect marine organisms in the Bay.

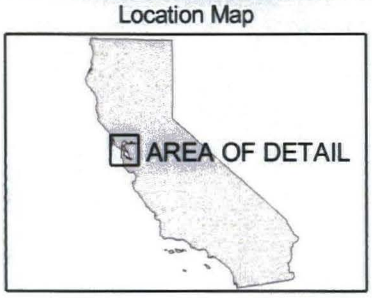
- **Appendix I – Response to Regulatory Agency Comments on the Draft and Draft Final Revised Feasibility Study Report for Parcel C,** presents the comments received from regulatory agencies and others, for both the Draft and Draft Final Revised FS for Parcel C.

SEC. 1 - FIGURES

FIGURES



Location Map



SulTech

Hunters Point Shipyard, San Francisco, California

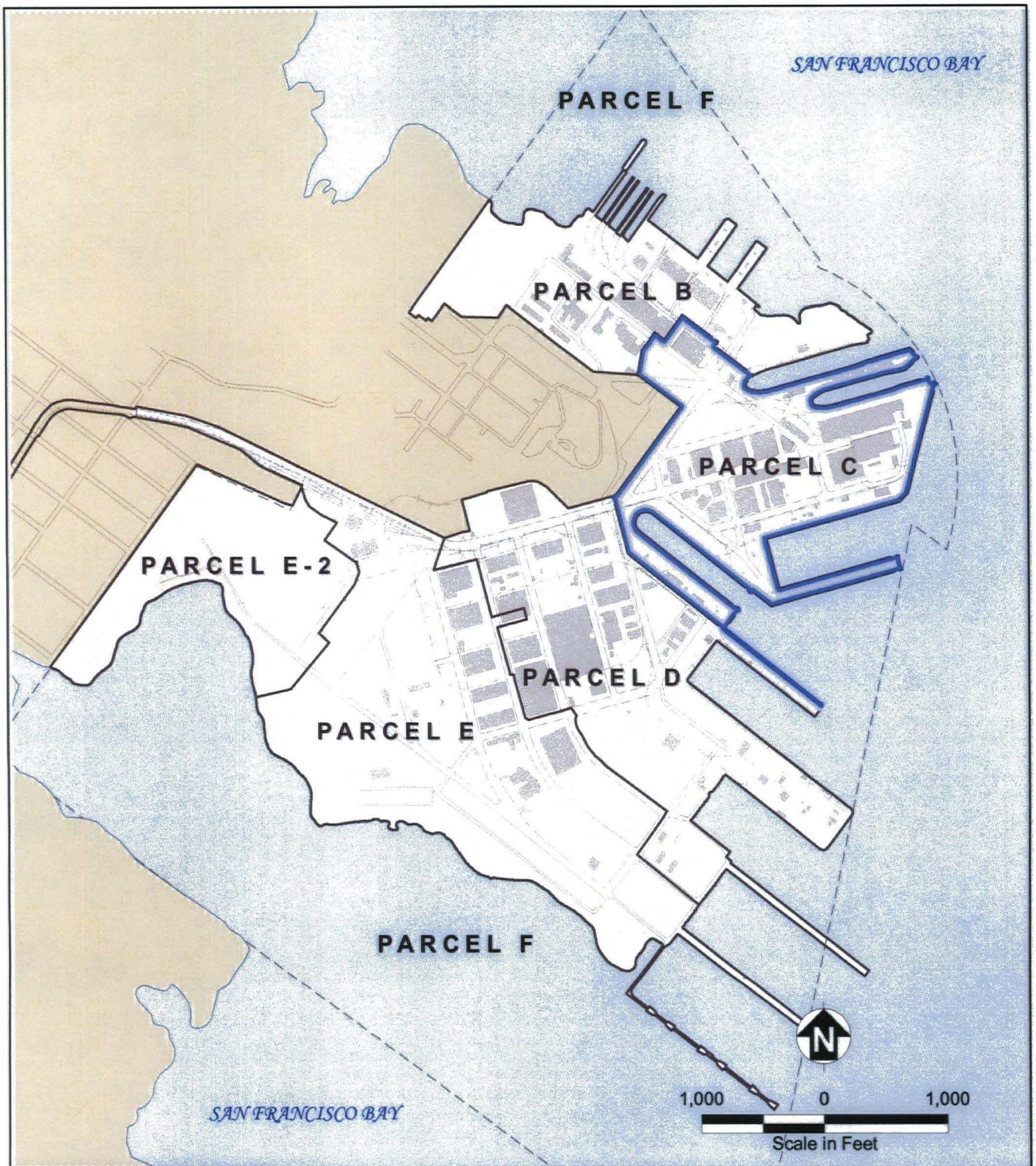
U.S. Department of the Navy, BRAC PMO West, San Diego, California

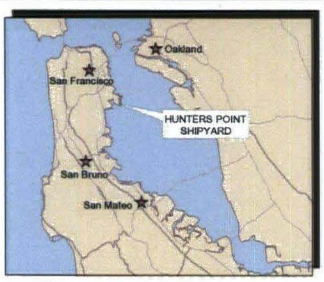
FIGURE 1-1

HUNTERS POINT LOCATION MAP

Feasibility Study Report for Parcel C

2008-07-08 V:\Hunters_Point\Projects\Parcel C\FS_2005\Nature and Extent\General_Figures\HPS location map.mxd TtEMI-SF Kevin Ernst





Location Map

- Parcel C Boundary
- Parcel Boundary
- Parcel F Boundary
- Non-Navy Property
- Building
- Road
- Rail Line

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Hunters Point Shipyard, San Francisco, California

U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 1-2

FACILITY LOCATION MAP

Feasibility Study Report for Parcel C

2008-07-08 V:\Hunters_Point\Projects\Parcel_C\FS_2005\Nature and Extent\General_Figures\HPS Base Map.mxd TtEMI-SF Kevin Ernst

SECTION 2

2.0 SITE CHARACTERIZATION

This section presents site characterization information concerning HPS and Parcel C. Section 2.1 provides HPS's history, including occupancy over time, progress through CERCLA, geographic units, and a summary of prior investigations, removal actions, and treatability studies. Section 2.2 provides information about HPS's environmental setting, including land use, historical areas, climate, topography and surface water drainage, ecology, soils, geology, hydrogeology, and current groundwater use and potential beneficial uses. Sections 2.3 and 2.4 present the nature and extent of soil and groundwater, respectively, for each of the 15 redevelopment blocks in Parcel C. Section 2.5 presents the CSM for Parcel C.

2.1 HUNTERS POINT SHIPYARD HISTORY

The purpose of this section is to provide a historical context for the reader. Section 2.1.1 presents the history of occupancy to address the use of the parcel prior to CERCLA, while Section 2.1.2 details the progress through CERCLA, including the investigations performed and reports developed as required for a Superfund site. Section 2.1.3 acquaints the reader with the spatial geographic units at Parcel C. Section 2.1.4 summarizes the history of investigations to provide further background on work completed to characterize Parcel C.

2.1.1 Hunters Point Shipyard Occupancy History

The headland on which HPS is located (see Figure 1-1) has been recorded in maritime history since 1776, first as Spanish mission lands used for cattle grazing and later, in the mid- to late 1800s, for its dry dock facilities. In the early 1900s, HPS was primarily used for industrial activities such as dry dock ship repair and fishing enterprises. Lodging houses, saloons, and various businesses were also located adjacent to the HPS facility.

In 1940, the U.S. government received title to the land at Hunters Point and began developing it as a shipyard. From 1945 to 1974, the Navy used HPS predominantly as a ship repair facility. Additional acreage, mostly on the south side of the base, was acquired in 1957. The Navy operated the shipyard as a ship repair facility through the late 1960s. The Navy ceased operations at HPS in 1974 and HPS remained relatively inoperative until 1976.

In 1976, the Navy leased 98 percent of HPS to a private ship repair company, Triple A Machine Shop, Inc. (Triple A). Triple A leased the property from July 1, 1976, to June 30, 1986. During the lease period, Triple A used dry docks, berths, machine shops, power plants, various offices, and warehouses to repair commercial and Navy vessels. Triple A also subleased portions of the property to various other businesses.

In 1986, the Navy resumed occupancy of HPS. Many of the subtenants under Triple A's lease remained tenants under the Navy's reoccupancy in 1986. Triple A vacated the property in March 1987. Only a few tenants remain, primarily the San Francisco Police Department and an artist colony with live/work facilities.

2.1.2 Parcel C Progress Through CERCLA

Because past shipyard operations left hazardous materials on site, HPS was placed on the NPL in 1989 as a Superfund site pursuant to CERCLA as amended by the Superfund Amendments and Reauthorization Act of 1986.

In 1991, HPS was designated for closure pursuant to the terms of the Defense Base Closure and Realignment Act of 1990 (PRC Environmental Management, Inc. [PRC] 1995a; Public Law 101-510). Closure activities at HPS involve environmental remediation activities and making the property available for nondefense use. In 1992, the FFA for HPS established a procedural framework and schedule for investigating and remediating, as necessary, the environmental effects associated with past activities at HPS (EPA 1990b).

In 1990, the Navy conducted a preliminary assessment (PA) to collect data on the conditions at HPS (Harding Lawson Associates [HLA] 1990). This was first in a series of investigations conducted at HPS under the provisions of CERCLA. The PA involved record searches, interviews, and limited field investigation.

Based on the findings from the PA, it was established that further investigations were required in order to properly characterize HPS. In 1994, the Navy conducted a site investigation (SI) (HLA 1994b). An SI involves the collection and evaluation of additional field data through activities such as air, soil, and groundwater sampling. During the SI, it was established that additional data were needed to understand the nature and extent of contamination at HPS. To further evaluate the nature and extent of the contamination and to identify areas with potential releases that occurred in the previous 10 years, the Navy conducted a site assessment (SA) in 1994 (HLA 1994a).

The RI for Parcel C was conducted from 1993 to 1996. The Draft Final RI Report was submitted to EPA Region 9 on March 13, 1997 (PRC, Levine-Fricke-Recon, Inc. [LFR], and Uribe & Associates [U&A] 1997). A FS was developed for Parcel C in 1997, and the Draft Final FS Report was submitted in 1998 (Tetra Tech EM Inc. [Tetra Tech] and LFR 1998). The FS used the results and analyses in the RI Report to identify, screen, and evaluate remedial alternatives for Parcel C and to define areas for proposed response action. Following the FS, the Navy and the regulatory agencies conducted a risk management review (RMR) that refined the areas for proposed response action. The Navy then conducted an interim removal action at Parcel C and a groundwater data gaps investigation.

The Navy has developed this Final FS Report to include the information from the investigations and removal actions to date. This FS Report addresses site characterization, risk assessment, RAOs, GRAs, and remedial alternative selection for Parcel C. The purpose of this process is to evaluate the remedial alternatives and select the methods that would be used to begin the cleanup that would ultimately lead to site closeout, removal from NPL status, and reuse by the City and County of San Francisco (CCSF).

2.1.3 Geographic Units at HPS and Parcel C

Geographic units at HPS include parcels, IR sites, groundwater remedial units (RU), and redevelopment blocks. This section discusses the relationship of these units.

At each parcel, contaminated sites at HPS were designated as IR sites, based on the information developed during the PA, SI, and SA. IR sites were in most cases identified by a two-digit number, for example, IR-28. Site characterization activities and sampling data were mostly planned and organized by IR site. To assess risk, the BCT agreed to divide all of HPS into two different size grids (residential and industrial) as a method of statistically calculating risk within an area for different future land use scenarios. The SFRA designated redevelopment blocks for Parcel C in accordance with the CCSF's planned future reuse. This report uses the risk grids and the redevelopment blocks as the basis for evaluating the results of the revised HHRA and developing remedial alternatives to address potential unacceptable risk present within Parcel C. The Navy acknowledges that the boundaries of the redevelopment blocks may be revised during redevelopment; however, the record of decision (ROD) will list the boundaries of the reuse categories. The chemicals at Parcel C determined to pose a potential unacceptable risk were identified as COCs. COCs are determined when the chemical-specific risk exceeds 1E-06 or the noncancer hazard exceeds 1. IR sites are still referred to in the characterization sections of this Final FS Report as they relate to historical operations and resulting sources of contamination found in Parcel C soil and groundwater.

In 1997, the CCSF's redevelopment plan assigned reuse categories to all of HPS by redevelopment blocks (SFRA 1997). In some cases, IR sites are completely contained within redevelopment blocks, and in other cases, the IR sites cross redevelopment block boundaries. Figure 2-1 shows Parcel C, the redevelopment blocks, and the IR site boundaries. Figure 2-2 shows the IR site boundaries and the RU boundaries. Table 2-1 outlines the correlation between the redevelopment blocks and the IR sites.

Parcel C includes 14 IR sites: IR-06, IR-25, IR-27, IR-28, IR-29, IR-30, IR-45, IR-49, IR-50, IR-51, IR-57, IR-58, IR-63, and IR-64 (see Figure 2-1). IR-06 and IR-25 were initially located in Parcel B and addressed in the Parcel B RI. These sites were transferred to Parcel C in 2002 following the discovery of volatile organic compounds (VOC) in soil and groundwater related to the activities in Building 134 (Navy 2002; SulTech 2007). Sites IR-45, IR-49, IR-50, and IR-51 are facility-wide sites consisting of utilities that cut across other IR sites, or are the locations of former transformer storage areas.

According to the redevelopment plan (SFRA 1997), Parcel C will consist of 15 redevelopment blocks (see Figure 2-1). The blocks and their proposed zoning are listed below.

- The north and south-central areas are designated for "Mixed Use," which includes retail/gallery, art studio, artist live/work, warehouse, and hotel/conference space. This zoning includes redevelopment blocks 10, 11, 13, and 26.

- The eastern portions of Parcel C are planned for "Educational/Cultural" use. According to the reuse plan, this includes education and training facilities, museums, theaters, retail, restaurants, galleries, conference facilities, and artist studios. This zoning includes redevelopment blocks 20B, 22, and 25.

- Much of the northern, eastern, and southern edges of Parcel C are planned for "Open Space." This zoning includes redevelopment blocks COS-1, COS-2, and COS-3.

- The southern portion of Parcel C, surrounding Dry Dock 4 and the North Pier, are designated for "Maritime/Industrial" use. This zoning includes redevelopment block CMI-1.

- The west and central portions of Parcel C are planned for "Research and Development." According to the reuse plan, this includes manufacturing, processing, fabricating, data processing, telecommunications, artist studios, and live/work spaces (SFRA 1997). This zoning includes redevelopment blocks 18, 20A, 23, and 24.

The Navy has currently defined four RUs for groundwater at Parcel C (RU-C1, RU-C2, RU-C4, and RU-C5). A former RU-C3 is now included in RU-C4. As described in the "Sampling and Analysis Plan for the Basewide Groundwater Monitoring Program" (Tetra Tech 2004b), RUs consist of a known source of contamination and the area of contaminated groundwater associated with that source. For purposes of this report, the boundaries of the RUs have been defined by the plumes that were delineated for purposes of the risk assessment (see Section 3.1). These boundaries are consistent with the approximate boundaries discussed in current groundwater monitoring reports (CE2-Kleinfelder 2007). The RU boundaries are shown on Figure 2-2.

This Final FS Report organized the presentation for soil based on the redevelopment blocks, including nature and extent characterization, the HHRA, RAOs, GRAs, and remedial alternatives. All data are assigned to a redevelopment block and are evaluated in this Final FS Report. Areas without data are also addressed in the remedial alternatives. Parcel-wide IR sites (such as storm drain lines) will be addressed as a component of the specific redevelopment block they affect. Table 2-1 lists the IR sites, their primary features, and the relationship of these sites to redevelopment blocks. Table 2-2 lists the buildings at Parcel C.

2.1.4 Previous Investigations, Removal Actions, and Treatability Studies

Extensive investigations, removal actions, and treatability studies have been completed at Parcel C. These activities support the development of the CSM, as well as the effectiveness and implementability of process options to clean up the parcel. This section provides summary information on these activities, as well as the reports in which this information was originally presented.

2.1.4.1 Previous Investigations

Extensive investigations were performed at HPS between 1972 and 1989, when HPS was listed on the NPL and formally entered the CERCLA process. The overall investigative history of Parcel C, including both CERCLA and pre-CERCLA activities, is summarized in Table 2-3.

Table 2-3 includes relevant basewide and Parcel C specific investigations and describes the objective of the work, the activities, and the conclusions.

2.1.4.2 Previous Removal Actions

Several removal actions and cleanup activities have been performed at Parcel C. Removal and cleanup actions have addressed the following media:

- Soil
- Sediment in storm drain lines
- Underground storage tanks (UST)
- Storm drain and sewer lines
- Decontamination of industrial process equipment and waste consolidation

Table 2-4 summarizes the removal actions and cleanup activities conducted at Parcel C. Table 2-5 summarizes the current status of the former USTs at Parcel C. Table 2-6 summarizes removals and closures in place of the former USTs at Parcel C. Table 2-7 summarizes the current status of the former ASTs.

The following key soil removal actions were performed:

- Exploratory excavations (International Technology Corporation [IT Corp.] 1999).
- Removal actions at IR-06 and IR-25 when they were part of Parcel B under the Parcel B ROD (IT Corp. 2000).
- Time-critical removal action (TCRA) (Tetra Tech 2002a). Data gaps sampling was performed during the TCRA. Approximately 9,600 cubic yards (cy) of soil was excavated during the combination of the TCRA and the exploratory excavations. Table 2-8 summarizes these two removal actions and lists each excavation and volume of soil excavated and disposed of at a permitted facility.

Figure 2-3 presents the aboveground storage tank (AST), UST, and excavation locations. Table 2-8 also notes where TCRA investigations were completed at former UST locations. For example, during the TCRA investigation, petroleum and PAHs were detected adjacent to UST S-209 and this area was excavated adjacent to the closed-in-place tank in redevelopment block 26.

The basis of the excavation areas for the TCRA was the RMR. The RMR process was developed and conducted during a series of meetings held by the Navy and the regulatory agencies beginning in 1999 through July 2000. The process employed various criteria and decision rules to reevaluate whether response actions were required at the IR sites in Parcel C.

At the conclusion of the RMR process, the review team confirmed or eliminated sites from proposed response action based on current risk. After completion of the review, all sites fell into one of the following three categories: (1) sites for which the team agreed no response action was required, (2) sites for which the team agreed response action was required, and (3) sites for which the team did not yet agree on the course of action. The team produced a table summarizing their analysis and recommendations. The results of the RMR process and the TCRA cleanup goals are provided in the "Final Sampling and Analysis Plan, Parcel C Soil Site Delineation" (Tetra Tech and Washington Group International 2001).

Approximately 3,000 soil samples were collected during the Parcel C TCRA. Some sites recommended for action during the RMR process were delineated but not excavated. The revised HHRA evaluates all of the data from samples that have not been excavated. Table 2-8 briefly summarizes the RMR recommendations and the current status of the TCRA sites.

In 2002 through 2004, the Navy completed activities to consolidate and remove waste throughout Parcel C. Industrial process equipment was decontaminated, sumps cleaned, and waste was consolidated, including removal of waste material stored in or near buildings and removal or encapsulation of asbestos-containing material (Tetra Tech FW, Inc. 2004).

Storm drains and sewer lines were removed in 2007 at portions of redevelopment blocks 10 and 11 in Parcel C to address radiological concerns. Storm drains and sewer lines were addressed in these locations because they were connected to lines in Parcel B. Storm drain and sewer lines at the remainder of Parcel C are planned for removal in 2010.

2.1.4.3 Treatability Studies

This section summarizes the groundwater treatability studies that have been conducted at Parcel C. These studies include chemical oxidation, zero-valent iron (ZVI) injection, and anaerobic-aerobic bioremediation techniques. The studies are organized below by RU. Groundwater treatability studies have not been conducted at RU-C2.

RU-C1. A soil vapor extraction (SVE) system that included 14 SVE wells, 36 vapor monitoring wells and an extraction system was installed and operated for over 3 months inside Building 231 beginning in March 2001. Analytical results for soil vapor samples collected during operation of the SVE system indicated low concentrations of VOCs in the vadose zone, primarily cis-1,2-dichloroethene (DCE), tetrachloroethene (PCE), and trichloroethene (TCE). The cumulative removal of VOCs was estimated at less than 2.5 pounds, with over 90 percent of the mass from cis-1,2-DCE, PCE, and TCE.

An SVE system that included 5 SVE wells and 23 vapor monitoring wells was installed inside Building 211/253 and operated for over 4 months beginning in February 2001. Analytical results for soil vapor samples collected during SVE operations indicated low concentrations of TCE and other VOCs were located primarily in the center of the study area and beneath the sumps. The highest concentration of TCE was detected in the center of the study area. VOCs detected beneath the sumps were mostly aromatic hydrocarbons such as trimethylbenzene and isopropyltoluene.

In April 2001, a chemical oxidation treatability study was implemented in Building 253 at RU-C1. Three injection wells and six vapor monitoring wells were installed, and potassium permanganate was injected to promote the oxidation of TCE. The treatability study was abandoned following a permanganate release to the Bay from a connection between a storm drain and the treatability study area. The subject storm drain was located between Buildings 253 and 228. Elevated concentrations of chromium and chromium VI were observed in 2001 in groundwater samples collected from this area subsequent to the treatability study. The concentrations decreased in 2002. The increase and subsequent decrease in chromium concentrations is attributed to mobilization of metals by permanganate oxidation (Tetra Tech 2004a).

RU-C2. An SVE system that included of 6 SVE wells and 22 vapor monitoring wells was installed inside and immediately north of Building 251 and was operated for over 4 months beginning in February 2001. Chlorobenzenes, PCE, vinyl chloride, trimethylbenzenes, and other aromatic hydrocarbons were detected in soil vapor samples collected during installation of the SVE system and wells. These chemicals were not evaluated during previous investigations because soil goals for trimethylbenzenes and other aromatic hydrocarbons were not exceeded. Higher VOC concentrations in soil gas were confined to the vicinity of the sumps in the former paint room in Building 251. The cumulative VOC mass removed within the test performance period was estimated at 3 pounds, with over 50 percent of the VOC mass from chlorobenzenes, 20 percent from trimethylbenzenes, 10 percent from PCE, and the balance from other aromatic hydrocarbons (Tetra Tech 2004a).

RU-C4. An SVE system that included 4 SVE wells and 38 vapor monitoring wells was installed and operated for over 4 months inside of Building 272 beginning in March 2001. The SVE wells were screened from 2 to 6 feet bgs. TCE was the only chemical consistently detected in soil samples collected during installation of the wells. The cumulative VOC mass removed during the operating period was estimated at 5.4 pounds, with a nearly constant mass removal rate of 0.004 pounds per hour. Ninety-seven percent of the mass removed was TCE, with the remaining 3 percent consisting of benzene, ethylbenzene, toluene, and xylenes (Tetra Tech 2004a).

In November 2002, a ZVI injection technology demonstration was initiated in Building 272 at RU-C4. Fieldwork was conducted from November 2002 to March 2003. The purpose of the study was to evaluate the cost and effectiveness of ZVI injections at reducing concentrations of TCE and other VOCs in groundwater in Parcel C through reductive dechlorination. The field work conducted as part of the study included an initial round of groundwater sampling, installation of four injection boreholes, injection of ZVI, conversion of one injection borehole to a monitoring well, and three rounds of post-injection groundwater sampling. The sampling was conducted 2, 6, and 12 weeks after injection. It was concluded from the study that the technology provided effective in-situ remedial treatment of the source zone of chlorinated VOCs at the site (Tetra Tech 2003b).

In 2004 and 2005, a second ZVI treatability study was performed as a follow-on study. The primary objective of this treatability study was to evaluate the effectiveness of the ZVI technology in treating lower residual chemical concentrations over a larger area with similar geology. The locations for this treatability study were based on the VOC plume in the northeastern corner of Building 272 evaluated during the 2002-2003 treatability study in November 2002. The plume area evaluated was expanded to include locations identified during subsequent investigations: areas of contamination located east and north of Building 272; the sump area of Building 281; and the alleys between Buildings 272, 273, and 281. The treatability study was conducted between June 2004 and January 2005 and included installing three new monitoring wells, baseline groundwater sampling, ZVI injection, and post-injection groundwater sampling. Fieldwork for the injection activities took place between September 7 and October 8, 2004. Over 72,000 pounds of ZVI powder was injected into the treatment zone. One baseline sampling and three post-injection sampling rounds were conducted. The baseline sampling was conducted in August 2004, and post-injection sampling was conducted 2, 6, and 12 weeks after completion of the injection.

Comparison of pre- and post-injection groundwater concentrations of chlorinated VOCs indicated that the ZVI treatment was effective in reducing chemical concentrations (Innovative Technical Solutions, Inc. [ITSI] 2005). Specifically, TCE concentrations within the treatment zone decreased from a baseline average of 1,385 µg/L prior to the study to a post-injection average of 35 µg/L. Significant reduction percentages were also observed for cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, and vinyl chloride, which are intermediate degradation products of TCE (ITSI 2005).

RU-C5. An SVE system that included 17 SVE wells and 46 vapor monitoring wells was installed and operated for nearly 5 months inside Building 134. The wells were installed in January 2001, and the system operated from February to June 2001. SVE wells were located in the dip tank and sump area in the northern portion of Building 134, as well as in the central area of the building, near IR25MW16A; the SVE wells were screened from 2 to 10 feet bgs. Both soil-gas and soil sampling results indicated PCE, TCE, DCE, and TPH as gasoline were present. The cumulative VOC mass removed within the test performance period was estimated at 5 pounds, with mass removal rates between 0.002 and 0.005 pounds per hour. Nearly half of the extracted vapors were Freon-11 (trichlorofluoromethane), and the remainder was primarily PCE, TCE, toluene, and xylenes (Tetra Tech 2004a).

Between April 2004 to May 2005, an in-situ sequential anaerobic-aerobic bioremediation treatability study was conducted in the area of the former degreaser and separator pits at Building 134 in RU-C5. The objective of the treatability study was to evaluate the potential of this technique for treating chlorinated and nonchlorinated organic compounds in groundwater. The treatability study was conducted in two stages, anaerobic (Stage 1) and aerobic (Stage 2). Stage 1 was conducted from April to December 2004. Stage 2 was conducted from January to May 2005. The purpose of Stage 1 was to evaluate the biological degradation of chlorinated organics, including the chlorinated ethenes, ethanes, and benzenes under anaerobic conditions. The purpose of Stage 2 was to evaluate the biodegradation of potentially reduced residual chlorinated organic and nonchlorinated organic chemicals under aerobic conditions. The treatability study demonstrated that sequential anaerobic and aerobic bioremediation is an effective treatment technology for groundwater plumes of mixed chlorinated organic chemicals, such as that observed at RU-C5 (Shaw Environmental, Inc. 2005).

2.2 HUNTERS POINT SHIPYARD ENVIRONMENTAL SETTING

This section provides information related to HPS's environmental setting, including land use, historical areas, climate, topography and surface water drainage, ecology, soils, geology, hydrogeology and current groundwater use and potential beneficial uses for groundwater.

2.2.1 HPS and Surrounding Land Use

The main portion of HPS is situated on a long headland located in the southeastern part of San Francisco extending eastward into the Bay (see Figure 1-1). The headland is bounded on the north and east by the Bay and on the south and west by the Bayview/Hunters Point district of San Francisco. HPS consists of 866 acres: 420 acres on land and 446 acres under water in the Bay.

Parcel C consists of about 79 acres of shoreline and lowland coast along the east-central portion of HPS (see Figure 1-2). Parcel C is located south of Parcel B and east of Parcel D, and is bounded to the north by Parcel B, east by the Bay, south by Berths 10 and 11, southwest by Dry Dock 4, and west by Fisher Avenue. Parcel C is the oldest portion of the shipyard and was used almost exclusively for industrial purposes since the late 1800s. Seventy buildings, 3 dry docks, 1 wharf, 11 ship berths, and 1 pier are located within the boundaries of Parcel C.

Historically, the dominant land use of Parcel C has been for shipping, ship repair, and office and commercial activities. Parcel C land use and historical areas are discussed below. Figure 2-1 shows the reuse areas and locations of the buildings at Parcel C. According to the redevelopment plan (SFRA 1997), Parcel C is expected to be zoned to accommodate buildings for cultural and institutional uses; buildings for research and development; and mixed-use areas for live/work spaces for artists, studios, galleries, warehouses, and hotels. In addition, the area along the eastern portion of Parcel C bounded by the Bay will be set aside as open space (see Figure 2-1). Section 2.1.3 lists the proposed zoning categories and the redevelopment blocks associated with each category.

2.2.2 Parcel C Historic Areas

In 1989, a survey of the historic resources at HPS identified the area surrounding and adjacent to Dry Dock 2 and Dry Dock 3 in Parcel C as the Hunters Point Commercial Dry Docks Historical District. Significant structures within this district include Dry Dock 2, Dry Dock 3, the one-story brick pump house (Building 205), a one-story brick gatehouse (Building 204), a one-story brick tool and paint building (Building 207), and the seawalls and wharves connected with the dry docks. These buildings are not currently listed on the National Register of Historic Places, but they have been determined to meet the eligibility requirements.

The survey of historical resources also identified Building 253, the ordnance and optical building, as the only other structure at Parcel C with the potential to qualify for the National Register of Historical Places. This building was the work of an important 20th century architect, and received an award for its design. However, this building is radiologically impacted (Navy 2004b).

2.2.3 Climate

The climate in the HPS area is characterized by partly cloudy, cool summers with little precipitation and mostly clear, mild winters with moderate precipitation. Air monitoring conducted at HPS indicated that the prevailing wind direction is west to east (Brown and Caldwell 1995). Airborne dust and volatile emissions are therefore expected to be transported primarily east toward the Bay. The average monthly wind speeds in San Francisco (measured at the San Francisco Airport) range from 7 to 14 miles per hour (National Climatic Data Center 2002). Normal annual rainfall in San Francisco is approximately 20 inches (available online at: http://www.worldclimate.com/).

2.2.4 Topography and Surface Water Drainage

Land at HPS consists of relatively level lowlands constructed by excavating portions of surrounding hills and placing nonengineered fill materials along the margin of the Bay. The remaining land is a moderate to steep sloping, northwest-trending ridge. Figure 2-4 shows ground surface elevation ranges for HPS in the vicinity of Parcel C. Ground surface elevations are generally 0 to 18 feet above mean sea level (msl) in the lowlands at Parcels B through E. Parcel C is located in the lowlands, with surface elevations ranging from 5 to 10 feet above msl over most of the parcel. Rock material from the ridge was generally used for filling in portions of the lowlands and constructing building pads.

Surface water at HPS drains primarily in a sheet-flow pattern from either the highlands north of Navy property to the surrounding lowlands or from the lowlands themselves. In Parcel C and most of HPS, runoff has historically been collected by the storm drain system and discharged to the Bay through outfalls. Sanitary sewer flow historically discharged to the CCSF sanitary sewer system for treatment at the Southeast Water Pollution Control Plant (PRC, LFR, and U&A 1997). The current location and distribution of the storm drain and sanitary sewer lines at Parcel C are presented on Figure 2-5. Portions of the storm drains and sewer lines were removed from IR-06 and IR-25 in 2007. The storm drains and sewer lines across the remainder of Parcel C are scheduled to be removed in 2010 as part of ongoing radiological investigations. Stormwater flow will be redirected via surface drainage swales.

2.2.5 Ecology

The aquatic ecology of HPS is characterized by bay sediments disturbed in places by former dredging activities, and a manmade shoreline consisting of either concrete and timber wharfs. Physical structures, such as docks and berths, serve as artificial habitats for estuarine life. The marine environment is disturbed as a result of commercial, industrial, and recreational activities in the Bay. Several hundred species of plants and animals are believed to live at or near HPS, including terrestrial and marine plants and algae; benthic and water column-dwelling marine animals such as clams, mussels, amphipods, and fish; insects; amphibians; reptiles; birds; and mammals.

Threatened or endangered species are not known to inhabit HPS or its vicinity (Environmental Science Associates 1987). Some endangered species have been infrequently observed at HPS, including winter run Chinook salmon, Peregrine falcon, burrowing owls, and California brown pelicans.

More than 90 percent of the ground surface at Parcel C is covered by pavement and former industrial buildings. The ecological risk assessment performed basewide at HPS concluded Parcel C was almost entirely paved except for small pockets of vegetation, which are not considered suitable habitat for animal life (PRC 1994b; Appendix F of the RI Report [PRC, LFR, and U&A 1997]). Exposure pathways to terrestrial species are incomplete because of the predominance of paved areas in Parcel C, which precludes the presence of viable habitats. The ecological risk assessment stated that hazardous substances may migrate to groundwater and affect the Bay (PRC 1994b).

Future use of Parcel C includes 15 acres (less than 20 percent of the parcel) for hard surface open space reuse (SFRA 1997). Open space reuse at Parcel C is planned along the bay front between Dry Dock 2 and Dry Dock 4, adjacent to Berths 1 through 4. The Redevelopment Plan identifies plazas, promenades, and ancillary commercial uses as options for hard surface open space areas (SFRA 1997).

Offshore sediment characterization is discussed in the Parcel F FS Report (Barajas & Associates, Inc. 2007).

2.2.6 Soils

Soils at HPS are derived from underlying rocks and weathered material or were imported as fill. Parcels B through E-2 are primarily covered by lowland soils, which are flat to gently sloped urban land (U.S. Soil Conservation Service 1991). Lowland soils at HPS have a high liquefaction potential, especially in areas that have subsided as a result of the Loma Prieta earthquake of 1989 (U.S. Soil Conservation Service 1991). HPS soils are described in detailed in Appendix H of the Parcel C RI Report (PRC, LFR, and U&A 1997). Figure 2-6 shows the surficial geology of HPS.

2.2.7 Parcel C Geology

This section provides an overview of Parcel C geology. For a more detailed description of the Parcel C geology, refer to the Parcel C Groundwater Summary Report, Phase III Groundwater Data Gaps Investigation (GDGI) (Tetra Tech 2004a). Shallow subsurface geology below HPS consists of five units: Quaternary age artificial fill material, three unconsolidated Quaternary age sedimentary units, and the Jurassic-Cretaceous-age Franciscan Complex bedrock. In general, the stratigraphic sequence of these geologic units, from youngest (shallowest) to oldest (deepest), is as follows:

- Artificial Fill (Qaf)
- Undifferentiated Upper Sands (Q_{uus})
- Bay Mud (Q_{bm})
- Undifferentiated Sediments (Q_u)
- Bedrock (K_f)

The artificial fill material overlies unconsolidated Holocene age sediments (Q_{uus}, Q_{bm}, and Q_u). The Holocene sediments were deposited on an uneven eroded bedrock surface across HPS. The overburden (artificial fill and unconsolidated sediments) above the bedrock at Parcel C ranges from less than 1 foot thick south of RU-C5 to about 130 feet thick along the southern edge of Parcel C. The following figures present cross sections or cross-section information for Parcel C:

- Figure 2-7: Hydrogeological cross-section location map for the RU-specific cross sections
- Figure 2-8: RU-C1 hydrogeological cross sections (G-G' through I-I')
- Figure 2-9: RU-C2 hydrogeological cross sections (J-J' and K-K')
- Figure 2-10: RU-C4 hydrogeological cross sections (L-L' and M-M')
- Figure 2-11: RU-C5 hydrogeological cross sections (N-N' and O-O')

Artificial fill at Parcel C is extremely heterogeneous, consists primarily of construction material from building foundations, dry docks, berths, piers, and surrounding streets, and ranges in grain size from clay, silt, and sand to large boulders. The lower boundary of artificial fill is irregular, from both pre-emplacement erosion and former dredging activities.

The undifferentiated upper sands, below artificial fill, are Holocene estuarine and alluvial deposits that usually overlie, but in places are interbedded with, the Bay Mud.

The Bay Mud consists of fine-grained Holocene estuarine deposits of silt and clay. The Bay Mud underlies and is interbedded with the undifferentiated upper sands.

Undifferentiated sediments are the oldest unconsolidated sedimentary unit present beneath Parcel C. Undifferentiated sediments consist mostly of clay and silt and isolated sand lenses. The undifferentiated sediments at HPS occur between underlying bedrock and overlying undifferentiated upper sands and Bay Mud. In places, undifferentiated sediments are directly overlain by artificial fill materials. Undifferentiated sediments are thinner below the northern and western portions of the parcel, and are typically absent in those locations where the bedrock surface is shallow and the overburden is thin.

Bedrock at HPS (and in Parcel C) is part of the Franciscan Complex, a mélange of igneous, sedimentary, and metamorphic rocks assembled during subduction related continental-margin accretion (Wakabayashi 1992). Rock types of the complex include basalt (greenstone), serpentinite, chert, sandstones, siltstones, and shales. The bedrock occurs at depths of 0 to 25 feet across much of Parcel C; although in the southeast area near Berth 3, depth to the bedrock surface increases to over 110 feet bgs. The deep bedrock in this area is overlain by sand and clay beds of the Undifferentiated Sediments. Figure 2-12 presents the bedrock surface elevation contours at Parcel C.

2.2.8 Parcel C Hydrogeology

This section presents a brief overview of the Parcel C hydrogeology, and is presented by hydrostratigraphy, aquifer parameters, groundwater flow, and tidal influence. For a more detailed description of the Parcel C hydrogeology, refer to the Phase III GDGI Report (Tetra Tech 2004a).

2.2.8.1 Parcel C Hydrostratigraphy

The hydrostratigraphic units at HPS include (1) the A-aquifer, (2) the Bay Mud aquitard, (3) the B-aquifer, and (4) the F-WBZ. The Navy and the regulatory agencies have agreed to use this designation of the aquifer system at Parcel C. Figure 2-7 presents a map showing cross-section locations for the RU-specific cross sections, and shows the location of borings and wells with lithologic data. Figures 2-8 through 2-11 show the RU-specific cross sections.

The A-aquifer at HPS typically consists of unconsolidated Artificial Fill (Q_{af}) that overlies the Bay Mud aquitard and bedrock and forms a continuous zone of unconfined groundwater. Alluvium and colluvium, Undifferentiated Upper Sands, and shallow bedrock also are part of the A-aquifer at various locations across Parcel C, wherever the additional units are considered hydrologically connected to form a single aquifer unit. The A-aquifer generally thickens from about 10 feet in the southwest to as much as 80 feet in the northeast, but averages between 20 and 25 feet thick over most of Parcel C.

Bay Mud acts as an aquitard that separates the A- and B-aquifers in the central area of the parcel. The Bay Mud consists of highly plastic clay to sandy clay and generally thickens from 0 feet near the historical shoreline in the southwest to 40 feet near the bay margin in the northeast. The Bay Mud is discontinuous at Parcel C resulting in the A-aquifer being in direct hydraulic communication with the units of the B-aquifer.

The B-aquifer is present over an area of approximately 22 acres, or about 28 percent, of Parcel C. B-aquifer only occurs in the east-central area of the parcel from Dry Dock 2 to Building 251 to Berths 3 and 4, and in the area northwest of Building 134 (see Figure 2-13). The B-aquifer consists of the Undifferentiated Sediments; these deposits are typically separated from the A-aquifer by the Bay Mud. In the area north of Berths 3 and 4, these deposits thicken and consist of interbedded sands and clayey silts. The upper sand bed is generally 20 to 30 feet thick, whereas deeper sand beds are only 5 to 8 feet thick. In the area of Building 134, the B-aquifer has a very limited extent and has been characterized as having a low production capacity in the adjacent area of Parcel B. Where the Bay Mud is not present, the upper sand bed of the Undifferentiated Sediments is directly, hydraulically connected to the A-aquifer. The upper sand bed of the Undifferentiated Sediments ranges from about 5 to over 30 feet thick. In areas where this upper bed is relatively thin and Bay Mud is absent, the sediments are included in the A-aquifer.

The water table is within the saturated F-WBZ in about 30 acres (or 38 percent) of Parcel C. Fill material, either unsaturated or with seasonal thin perched water, overlies the F-WBZ across much of the 30-acre area. The F-WBZ is overlain by either saturated fill of the A-aquifer or saturated sediments of the B-aquifer across the other 49 acres of Parcel C. The distribution of the shallow F-WBZ and the A-aquifer are shown on Figure 2-14.

The F-WBZ is *not* considered an aquifer because of its low capacity for water production. The bedrock consists of serpentinite, with lesser amounts of greenstone and chert, and rare shale, sandstone, and siltstone. During the RI, the bedrock borings were usually dry during drilling and coring. The upper 15 to 30 feet are intensely fractured and moderately to deeply weathered, frequently forming a clayey gravel residuum from the serpentinite with calcite-filled fractures. The flow within the bedrock is dependent on the degree and continuity of fracturing, the fracture pattern, the extent of and resistance to weathering, and the amount of secondary precipitation of minerals in fractures. The flow is laminar seepage to turbulent sheet flow similar to water moving between two closely spaced bricks, rather than flow through a porous media such as sand. The bedrock has very limited groundwater storage capacity because most of the bedrock is not a porous medium. The field sampling records from monitoring events show the water production rates are generally low and highly variable, reflecting the low storage capacity. Review of drilling logs and monitoring well sampling records indicated the bedrock cherts and sandstones tend to be better producing areas. The highly weathered clayey gravel residuum of the upper F-WBZ is usually termed part of the overlying hydrostratigraphic unit (either the A-aquifer or B-aquifer, whichever directly overlies the F-WBZ), because the saturated upper F-WBZ clayey gravel residuum is in direct vertical hydraulic continuity with the overlying groundwater unit and behaves somewhat like a porous medium.

Monitoring well name designations (for example, A, B, or F) are generally based on the lithologic unit in which the well is screened. For example, wells screened in the Undifferentiated Sediments are designated "B," whereas the saturated sand of the Undifferentiated Sediments may be labeled part of the "A-aquifer" or "B-aquifer" depending on whether or not the Bay Mud Aquitard is present. The one exception to this well labeling rule is at Building 134 of RU-C5, where treatability study wells were installed in 2000 and mislabeled with the wrong unit designation.

Depth to the top of the A-aquifer occurs at approximately 8 to 10 feet bgs across most of Parcel C. Groundwater flows generally south/southeast across Parcel C toward the Bay, except at northern portions of the parcel where the primary flow direction is toward the dry docks.

2.2.8.2 Hydraulic Characteristics

Slug tests were performed in the mid 1990s at Parcel C, and the results were reported in the Parcel C RI Report (PRC, LFR, and U&A 1997). Constant rate discharge pumping tests were conducted at Parcel C between July 2000 and August 2002, and results were reported in the Phase III GDGI Report (Tetra Tech 2004a). The pump tests provide a more representative assessment of aquifer characteristics. Table 2-9 provides the results of the pump tests and slug tests, as well as calculated aquifer parameters, including hydraulic conductivity, transmissivity, and storage coefficient. No discharge tests have been performed in the bedrock at HPS.

2.2.8.3 Groundwater Flow

Horizontal groundwater flow and groundwater recharge and discharge are discussed below. The horizontal groundwater flow discussion is based on the 2004 fourth quarter water levels measured during HPS basewide quarterly groundwater monitoring at Parcel C (Kleinfelder 2005). Vertical groundwater flow and groundwater recharge and discharge discussions are based on data presented in the Parcel C Phase III GDGI Report (Tetra Tech 2004a). Groundwater flow directions may shift in the future from the directions presented in this section, since the pump at the lift station for storm sewer lines of Parcel C was shut down in May 2007. The groundwater flow directions and chemical distribution in groundwater should be reevaluated prior to preparing the remedial design.

Groundwater flow patterns at HPS are largely determined by the upgradient Parcel A topographic high (west of Parcel C) centrally located at HPS with respect to the Bay shoreline configuration. The general pattern of groundwater flow is radially away from the Parcel A topographic high and toward the shoreline. Figure 2-15 presents a groundwater elevation contour map for the A-aquifer at Parcel C, for measurements collected in November 2004 (Kleinfelder 2005).

At Parcel C, the general direction of groundwater flow is to the east where groundwater discharges into the Bay. Locally, at bayside perimeter locations of the parcel, the groundwater flow direction is southeast or northeast directly toward the Bay or Dry Dock or the nearest surface water. Dry Docks 2 and 3 were constructed with concrete seawalls, and are shown as areas with no groundwater flow on Figure 2-15. Leaking storm drains, sewer lines, and water supply lines influence groundwater movement across Parcel C.

The B-aquifer is present below central portions of Parcel C. Figure 2-16 presents groundwater elevations for B-aquifer wells in Parcel C for the November 2004 measurement event. The groundwater elevation data for the B-aquifer at Parcel C suggest a groundwater flow direction toward the south/southeast.

The principal sources of groundwater recharge for the A-aquifer at Parcel C are considered to be the horizontal groundwater flow from areas upgradient of Parcel C (lateral influx), precipitation infiltration, and leaking sections of water lines. Only the F-WBZ with overlying fill material exists in upgradient areas (within several hundred feet of the former Parcel A). The upgradient F-WBZ groundwater laterally flows into the A- and B-aquifers. Discharge from the A-aquifer occurs principally as lateral flow of groundwater to the Bay (lateral outflux) at the shore or through ruptured utility corridors. Based on water level data from fourth quarter 2004, groundwater highs in the A-aquifer occur in the area of Buildings 270 and 251, indicating recharge areas. In these recharge areas, the vertical gradient is down toward the B-aquifer, although the downward vertical flow will be impeded by the Bay mud aquitard. Limited paired well data are available for the A- and B-aquifers across Parcel C. Water levels at downgradient well cluster IR28MW171 show an upward vertical gradient, although data from other downgradient areas are inconclusive about potential vertical flow gradients. Figure 2-13 shows areas where the A-aquifer and the B-aquifer may be in direct contact. Depending on the vertical hydraulic gradient where the two aquifer units are in contact, the A-aquifer may be recharged by or discharge to the underlying B-aquifer or F-WBZ.

The primary source of groundwater recharge to the B-aquifer at Parcel C is horizontal groundwater flow from upgradient areas (lateral influx). At areas where the aquitard is nonexistent, recharge to the B-aquifer may also come from the overlying A-aquifer, particularly when infiltration from precipitation recharges the A-aquifer. Based on potentiometric surface maps developed as part of the basewide groundwater monitoring program, groundwater flow from the B-aquifer in the central area of Parcel C is toward the Bay and not toward other parcels. There is no potential for migration of B-aquifer groundwater from Parcel C to Parcels D, E, or E-2 because of the limited extent of the B-aquifer and the lack of any hydraulic connection with the B-aquifer in the other three parcels.

B-aquifer groundwater in the area of RU-C5 in the northern portion of Parcel C has been hydraulically contained by leakage to the sewer line at Building 134 that created a groundwater sink. The pump for the sewer line was shut down on May 1, 2007, and removed on June 1, 2007. As a result, the groundwater sink is expected to disappear. A groundwater divide is expected to form in the area of Building 134, with groundwater flow shifting to the north and south. Groundwater levels will be monitored at IR-25 through 2008 and 2009 to evaluate the change in flow and shifts in chemical migration. The B-aquifer has a very limited extent in this area, and has been characterized as having a low production capacity in the adjacent area of Parcel B.

The F-WBZ is recharged by upgradient groundwater that flows from the bedrock hill located west of Parcel C. Depending on the vertical component of groundwater flow, the F-WBZ at a particular location may be recharged by or discharge to either the A- or B-aquifers. Discharge from the F-WBZ is to the A- and B-aquifers and to the Bay.

2.2.8.4 Tidal Effects

Tidal studies were conducted at Parcel C during the Phase III GDGI to evaluate the extent of tidal influence and tidal mixing in groundwater. Tidal mixing refers to the influx and mixing of the Bay's saline surface water into near-shore groundwater by daily tidal action; this results in degradation of groundwater with a significant increase of total dissolved solids (TDS) to above 10,000 milligrams per liter (mg/L). Tidal effects on Parcel C groundwater are important because much of Parcel C is adjacent to the Bay with which the shallow aquifer system is hydraulically connected. Tidal effects on groundwater are observed throughout Parcel C, except for the most inland portions.

The maximum fluctuation of Bay water levels during the tidal influence study was about 10 feet. The A-aquifer tidal influence zone, defined as the area where the maximum tidal fluctuation exceeds 0.10 feet, extends about 150 to 500 feet inland from the Bay (not considering Dry Dock 2, which is hydraulically separated from the groundwater by the dock wall). Tidal effects on A-aquifer groundwater are strongest near the eastern and southeastern shoreline of Parcel C and become weaker toward the west and northwest.

The data are insufficient to define the boundary of the B-aquifer tidal influence zone, but at IR28MW401B, located over 200 feet from Dry Dock 2 to the north and over 650 feet from the Bay to the east and south, 1.2 feet of groundwater tidal fluctuations were observed. Tidal influence data indicated that tidal effects are generally stronger in the B-aquifer than in the A-aquifer, which is expected considering the semi-confined to confined nature of the B-aquifer and the generally unconfined nature of the A-aquifer.

The tidal mixing zone is defined as the area in the shallow aquifer near the shoreline where groundwater and seawater mix as a result of tidal fluctuations. Tidal mixing studies conducted at HPS have indicated a tidal mixing zone at least 70 feet wide (Tetra Tech 2004a). Additional information on mixing between Parcel C groundwater and the Bay are outlined in the following subsection.

2.2.9 Groundwater Beneficial Use Evaluation

This section summarizes the evaluation of the potential for groundwater from the A- and B-aquifers at Parcel C to be used for domestic drinking and municipal water supply. The full beneficial use evaluation is presented in Appendix A. A primary purpose of the beneficial use evaluation is to determine if maximum contaminant levels (MCL) as established by EPA under the Safe Drinking Water Act for potential drinking water sources are ARARs for groundwater remediation goals. The results of the beneficial use evaluation are also considered in selection of potential exposure pathways in support of the baseline HHRA.

The hydrostratigraphic units at HPS include (1) the A-aquifer, (2) the Bay Mud aquitard, (3) the B-aquifer, and (4) the F-WBZ. The water table is within the shallow F-WBZ across about 38 percent of Parcel C, and is within the A-aquifer across the remainder of the parcel. The highly weathered clayey gravel residuum of the upper F-WBZ is usually termed part of the overlying hydrostratigraphic unit (either the A-aquifer or B-aquifer, whichever directly overlies the F-WBZ). The saturated upper sands of the Undifferentiated Sediments (normally comprising the upper B-Aquifer) are also included with the A-aquifer at Parcel C in areas where the Bay Mud either does not exist or is too thin to serve as an aquitard.

The potential beneficial uses of Parcel C groundwater have been referenced in several previous documents (see Appendix A). In an August 11, 2003, letter to the Water Board, the Navy provided their determination that the A-aquifer at HPS is not a municipal or domestic water supply source (Navy 2003). A September 25, 2003, response letter from the Water Board concurred that A-aquifer groundwater at HPS meets the exception criteria in the State Water Resources Control Board (SWRCB) Sources of Drinking Water Resolution No. 88-63 (SWRCB 1988; Water Board 2003). Therefore, the Parcel C beneficial use evaluation for the A-aquifer includes comparison with federal but not state groundwater classification criteria. The evaluation of the B-aquifer includes comparison to both state and federal criteria.

The State of California and EPA have different TDS and well yield criteria for evaluating groundwater as having potential as a municipal or domestic water supply. The state criterion is for TDS concentrations in groundwater to be lower than 3,000 mg/L, and the EPA (federal) criterion is for groundwater TDS concentrations to be lower than 10,000 mg/L. The state well yield criteria specify that an aquifer must be capable of providing an average sustained yield of 200 gallons per day (gpd) from a single well. The federal criteria specify that well yield must be sufficient to supply an average family, which is considered to be a minimum of 150 gpd; this level of production should be possible throughout the year.

Figure A-1 in Appendix A presents the spatial distribution of maximum TDS concentrations for the A-aquifer in Parcel C. Figure A-1 also includes results for wells located in Parcel B, thereby providing continuous spatial coverage for the northern section of Parcel C. As indicated on the figure, approximately 35 percent of Parcel C (the western and northern portions of the parcel) has TDS concentrations less than 3,000 mg/L and 25 percent has TDS concentrations between 3,000 and 10,000 mg/L. The remaining 40 percent of groundwater is near the Bay and is saline with TDS concentrations exceeding 10,000 mg/L; this saline groundwater has only limited industrial uses (see Appendix A).

Based on EPA groundwater classification guidance (EPA 1986), groundwater from the A-aquifer across approximately 60 percent of Parcel C is designated as Class IIB (a potential future source of drinking water or other beneficial use). The A-aquifer groundwater in the remaining 40 percent of Parcel C is designated as Class IIIA (not a potential source of drinking water and interconnected to surface water).

The following beneficial use evaluation is conducted to address federal guidance and determine if MCLs are ARARs for groundwater when developing CERCLA response actions. Differences in cleanup levels can be established depending on whether the groundwater is a current or potential source of drinking water or other beneficial uses. EPA can establish that MCLs are not ARARs on a case-by-case basis (EPA 1984). Where groundwater is not used as a current drinking water source under Class IIB, EPA can consider site-specific factors (SSF) such as the probability of use, cost of cleanup, and availability of alternative drinking water sources in determining cleanup requirements. In an attachment to a letter to the Navy sent on May 12, 1999, the EPA listed the SSFs that should be considered when determining whether all or portions of an aquifer should be considered a potential drinking water source for making a CERCLA cleanup decision (EPA 1999a). These factors include the following:

- Aquifer thickness
- Actual TDS levels
- Actual groundwater yield
- Proximity to saltwater and the potential for saltwater intrusion
- Quality of underlying water-bearing units
- Existence of institutional controls on well construction or aquifer use
- Information on the historic and current use of the aquifer
- Cost to remediate groundwater to MCLs
- Depth to groundwater

The A-aquifer was evaluated with respect to the above listed SSFs. As detailed in Appendix A, five of the nine SSFs categorize the A-aquifer as having low potential for use as a drinking water source. The remaining four SSFs—aquifer thickness, TDS concentrations, groundwater yield, and quality of underlying water-bearing units—categorize the A-aquifer as having moderate potential as a drinking water source. When these factors are considered together, the A-aquifer groundwater is not a viable potential source of drinking water; therefore, MCLs should not be ARARs for the A-aquifer at Parcel C for a CERCLA action.

The beneficial use evaluation of the B-aquifer was conducted in a similar manner. However, the state concurrence with the Navy's determination that the A-aquifer groundwater at HPS is not a potential drinking water source has not been extended to include the B-aquifer. Therefore, state criteria were also considered in the B-aquifer beneficial use evaluation.

The B-aquifer is present over an area of approximately 22 acres at Parcel C, of which about 6.5 acres exhibit TDS concentrations less than 10,000 mg/L. Figure A-2 shows the maximum TDS concentrations detected in each B-aquifer well. Approximately 70.5 percent of the areal extent of the B-aquifer at Parcel C has TDS concentrations exceeding 10,000 mg/L, giving this saline groundwater area a federal groundwater classification of Class IIIA (not a potential source of drinking water and interconnected to surface water). Only a small area of the B-aquifer (about 200 feet by 530 feet or 2.4 acres) in the vicinity of and to the northwest of Buildings 251 and 252 meets the state TDS criterion of less than 3,000 mg/L for drinking water beneficial use. The B-aquifer in this area is about 30 feet thick. Assuming a porosity of

30 percent, about 22.5 acre-feet of available fresh water meets the state TDS drinking water criterion. The remaining 18.5 percent (roughly 4.1 acres) of the Parcel C B-aquifer area has groundwater with TDS concentrations exceeding 3,000 mg/L and less than 10,000 mg/L (that is, brackish water).

Limited well yield data are available for the B-aquifer. However, well purging and field sampling data indicated the likelihood for sustainable yields exceeding 200 gpd, thus qualifying portions of the B-aquifer as a potential drinking water source according to both state and federal well yield criteria.

An evaluation of the SSFs for the B-aquifer was conducted to evaluate the potential for B-aquifer groundwater within Parcel C to be used as a drinking water source. As detailed in Appendix A, six of the nine SSFs categorize the aquifer to have low potential for use as a drinking water source. When the SSFs are considered together, the B-aquifer groundwater is not a viable potential source of drinking water. The production of B-aquifer wells in the freshwater area will induce the influx of poorer quality groundwater relatively quickly, resulting in the rapid degradation of the B-aquifer freshwater zone to brackish and then saline conditions. This degradation can be expected to occur within 3 weeks to 3 months of the onset of steady production from the B-aquifer. Additionally, the City and County of San Francisco prohibits installation of domestic wells within city boundaries. B-aquifer groundwater at HPS has never been and is not currently used as a drinking water source, nor has the groundwater ever been used for any other beneficial use. The City and County of San Francisco currently obtains its municipal water supply from the Hetch Hetchy watershed in the Sierra Nevada and plans to continue using the Hetch Hetchy watershed as a drinking water source in the future. As a result, the B-aquifer in Parcel C is not considered a viable source for drinking water beneficial use, and MCLs should not be ARARs for the B-aquifer at Parcel C for a CERCLA action. The A- and B-aquifers have potential agricultural and industrial beneficial uses. However, agricultural beneficial use for irrigation is limited by the salinity tolerance of plants and generally requires TDS concentrations of less than 700 mg/L, although some grasses can tolerate up to 1,500 mg/L of TDS. Very little of the A- and B-aquifers meet the TDS constraints for agricultural irrigation beneficial use as shown by the distribution of TDS on Figures A-1 and A-2 in Appendix A. TDS requirements for livestock vary by species, with cattle generally tolerating up to 10,000 mg/L of TDS, although TDS concentrations above 7,000 mg/L typically cause gastrointestinal problems. Water with TDS concentrations above 10,000 mg/L is not considered to have any agricultural use. The City and County of San Francisco's 1997 Reuse Plan does not provide for agricultural reuse (SFRA 1997).

Groundwater with TDS concentrations exceeding 10,000 mg/L has only very limited industrial uses. Water with TDS concentrations exceeding 10,000 mg/L is suitable for boiler and cooling operations at industrial facilities. Other industrial uses generally require treatment to lower TDS concentrations to below at least 7,000 to 8,000 mg/L prior to use. Other than the presence of nonaqueous-phase liquids, the presence of dissolved chemicals does not impede the industrial use of highly saline groundwater (exceeding 10,000 mg/L of TDS).

In conclusion, a beneficial use evaluation was conducted for both the A- and B-aquifers at HPS Parcel C. Based on TDS concentrations exceeding 10,000 mg/L, 40 percent of the A-aquifer area and 65 percent of the B-aquifer area meet groundwater classification Class IIIA and are not considered a potential source for drinking water. The remaining portions of each aquifer meet the TDS and well yield criteria to be Class IIB aquifers. However, the results of SSF evaluations for each aquifer determined that both aquifers are not viable potential sources of drinking water.

The Navy has accepted the substantive provisions of SWRCB Res. No. 88-63 as a State ARAR. The Navy has applied these substantive provisions to the B aquifer and bedrock water bearing zone (F WBZ) across Parcel C at HPS and determined that this groundwater is not a source of municipal and domestic drinking water supply. In a letter dated July 29, 2008, the Water Board stated that they concurred with the Navy's determination for the B-aquifer in the central area of Parcel C, and that they concurred with the inclusion of the upper weathered residuum of the bedrock with the A- and B-aquifer (Appendix A). The Water Board disagrees with the Navy's determination as it applies to the deeper, unweathered bedrock. The Water Board considers the B-aquifer in the area of Building 134 (RU-C5) to be part of the B-aquifer in Parcel B, and the B-aquifer in Parcel B is considered to be a distinct, separate groundwater unit from the B-aquifer in the central area of Parcel C.

The Navy will continue to work with the Water Board regarding the beneficial use of the B-aquifer at RU-C5 and the deeper bedrock zones. For this feasibility study, MCLs will apply at RU-C5 and the bedrock water bearing zone. MCLs are not considered ARARs for either the A- or the B-aquifer at HPS Parcel C for a CERCLA action outside these areas.

2.3 PARCEL C NATURE AND EXTENT OF SOIL CONTAMINATION

During a series of investigations at Parcel C from 1984 to 2002, the Navy collected soil samples from surface locations, shallow test pits, and deeper soil and monitoring well borings to determine whether hazardous substances and petroleum hydrocarbons had been released at Parcel C. These investigations resulted in an analytical data set consisting of thousands of soil samples analyzed for hundreds of chemicals. All analytical data from soil above 10 feet bgs that were collected at Parcel C and that have not been removed by subsequent excavations are presented in Appendix B. Appendix B consists of tables that present the analytical data and maps showing the sampling locations.

This section provides a summary of the evaluation of the nature and extent of soil contamination at Parcel C because several sampling events and removal actions have been conducted since soil contamination was originally evaluated in the 1997 RI Report. The Navy developed statistical tables for chemicals analyzed at Parcel C to focus the updated evaluation on the most significant soil contamination at Parcel C. Table 2-10 provides the statistics for all chemicals analyzed at Parcel C. To focus the discussion by redevelopment block, statistics were also developed for COCs and total petroleum hydrocarbons (TPH) at each redevelopment block (see Table 2-11). The COCs listed in this section were determined during the revised HHRA (see Section 3.1 and Appendix C).

Section 2.3.1 discusses parcel-wide nature and extent of soil contamination. Section 2.3.2 summarizes the nature and extent of COCs in each of the 15 redevelopment blocks at Parcel C.

2.3.1 Parcel-Wide Nature and Extent of Soil Contamination

Data used consisted of results from all soil samples collected at depths ranging from 0 to 10 feet bgs that were not removed by excavation during subsequent removal actions. This depth range was selected based on agreements with the BCT during the RMR process, where it was assumed that construction and maintenance activities could bring soil from a depth of 10 feet to the surface and, therefore, contamination from 0 to 10 feet bgs should be considered in the HHRA. Soil samples were analyzed for the following analytical groups: metals, chromium VI, VOCs, semivolatile organic compounds (SVOC), pesticides, polychlorinated biphenyls (PCB), cyanide, hydrazine, and organic lead. The statistical summary of these data is presented in Table 2-10, which includes the following:

- Individual analytical results compared with the following screening criteria:
  - Hunters Point ambient levels (HPAL) for metals; these statistically calculated values represent ambient concentrations in soil (PRC 1995b).
  - The practical quantitation limit (PQL) typically achieved for a given laboratory method in the case of polycyclic aromatic hydrocarbons (PAH) and pesticides.
  - Residential risk-based concentrations (RBC) developed in the revised HHRA. The RBCs were calculated using the methodology and scenarios developed for HPS. This HHRA methodology is described in Appendix C.
  - EPA Region 9-2004 residential preliminary remediation goals (PRG), included to address chemicals for which RBCs were not developed.
- General parcel-wide statistical information, such as percentage of detections greater than each of the criteria.

Ecological screening criteria are not included because Parcel C does not contain habitat for terrestrial receptors.

Table 2-10 lists the 208 chemicals that were analyzed at Parcel C. Thirty-eight were determined to be COCs in the HHRA. Sixty-six chemicals were never detected. Eighty chemicals were not detected above the residential RBCs developed in the revised HHRA. Five chemicals exceeded the residential RBCs but were not determined to be COCs because the detections exceeding criteria were not in residential areas. Ten chemicals did not have an RBC but were below the EPA Region 9 residential PRGs. Five of the detected chemicals are TPH fractions, which are not evaluated under CERCLA. Four of the detected chemicals are essential nutrients (calcium, magnesium, potassium, and sodium) that did not have EPA Region 9 PRGs or RBCs.

The following sections briefly summarize the magnitude and extent of the parcel-wide COCs, organized by analytical group.

2.3.1.1 Metals

Soil samples were collected and analyzed for 26 individual metals (including chromium VI and organic lead) at Parcel C, and 1,865 soil samples were analyzed for at least one metal at Parcel C. Twelve of these metals—aluminum, barium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, vanadium, and zinc—were detected in more than 90 percent of the soil samples collected and analyzed for metals at Parcel C. Similarly, arsenic, lead, and mercury were detected in more than 60 percent of the samples analyzed for these metals. The high frequency of detections indicates that metals are widespread across the site.

The results of the revised HHRA identified 12 metals as COCs: antimony, arsenic, cadmium, copper, iron, lead, manganese, mercury, nickel, thallium, vanadium, and zinc. Organic lead was also determined to be a COC. The analytical method for organic lead does not provide results for a specific chemical, but rather is a wet chemistry method that indicates the presence of some form of organic lead.

The Navy has evaluated potential sources of metals at Parcel C to assess where Navy activities may have contributed to metals concentrations in soil. For example, zinc concentrations detected near Building 258 may be associated with metal finishing activities. Lead may be associated with industrial activities. Organic lead is associated with former fuel sites. Marine paint and abrasive sandblast material also contain metals. Sources of metals contamination are discussed with each redevelopment block (see Section 2.3.2). Section 3.0 and Appendix C present the risk associated with all these metals based on the samples that remain in place. Figures 2-17, 2-18, and 2-19 show the distribution of metals across Parcel C.

In addition to identified industrial sources, the presence of metals across Parcel C is likely related to the fill and naturally occurring bedrock material. A group of metals related to the bedrock fill quarried to build HPS in the 1940s consistently exceeded RBCs across Parcel C. These metals occur in the local HPS bedrock and were distributed throughout all parcels as HPS was built. The highest concentrations of metals are in the areas where bedrock is close to the surface; for example, near Buildings 272 and 203 in redevelopment blocks 23 and 24. In areas where fill is present, the resulting distribution of ubiquitous metals concentrations in soil is nearly random. In this report, the term "ubiquitous" refers to metals that are naturally occurring or are in the same concentration ranges as naturally occurring metals in the source material (including material from the same geologic formations in the San Francisco area) that was used for filling operations at HPS. The Navy acknowledges that industrial sources of metals exist at HPS and that there is a potential that some concentrations of metals could have sources other than naturally occurring materials. The Navy has worked to remove these sources during the removal actions taken to date.

The distribution of arsenic and manganese in soil are used to illustrate the widespread occurrence of naturally occurring metals in the fill used to create Parcel C. Arsenic is a naturally occurring semi-metal associated with bedrock at HPS. Potential sources of arsenic include paints and abrasive sandblast material. Figure 2-17 illustrates the distribution of arsenic in post-excavation soil samples collected between 0 and 10 feet bgs. The data ranges on Figure 2-17 were selected to illustrate concentrations above and below the HPAL (11.1 milligrams per kilogram [mg/kg]) for arsenic. Although apparent clusters of higher arsenic concentrations appear in redevelopment blocks 22, 23 and 24, most arsenic concentrations are distributed across Parcel C with no apparent pattern to indicate their presence due to a release. The area where bedrock is closest to the surface in redevelopment blocks 23 and 24 also has significant concentrations of arsenic. Similarly, the distribution of manganese is presented on Figure 2-18, showing a high frequency of detections above the HPAL in areas where the bedrock is close to the surface. The Navy believes that arsenic and manganese are ubiquitous in the local bedrock that was used for fill or is present in the native soil, and that this is the source of these metals present throughout Parcel C. This same condition is true for most other metals at Parcel C.

Lead, mercury, organic lead, and zinc concentrations are presented on Figure 2-19. The presence of these metals may be due to industrial activities. Lead and organic lead are most frequently detected in the vicinity of former USTs. Mercury detections, however, are associated with the areas where bedrock is close to the surface in redevelopment blocks 23 and 24, similar to other metals present throughout Parcel C. In one location in redevelopment block 26, mercury was found where the potential exists for industrial contamination. This area will be addressed in the remedial alternatives. Zinc concentrations are clustered in the former pickling and degreasing area at Building 258, which is indicative of industrial contamination.

Antimony, cadmium, and thallium are detected infrequently at Parcel C. Antimony is found at redevelopment block 10 in the vicinity of the former tank farm. Cadmium and thallium detections were found in redevelopment blocks 23, 24, and 26 in the vicinity of Buildings 203 and 272, where bedrock is close to the surface. Cadmium was also detected adjacent to Building 258 in redevelopment block 20A, where cadmium may be related to the former metal machining and pickling activities.

2.3.1.2 Volatile Organic Compounds

In total, 1,428 soil samples were analyzed for VOCs at Parcel C, with analysis for 71 VOCs. In the revised HHRA, seven VOCs were determined to be COCs: 1,2-dichloroethane (DCA), 1,4-dichlorobenzene (DCB), benzene, naphthalene, PCE, TCE, and vinyl chloride.

VOCs in soil are associated with historic spills and releases. Figure 2-20 shows the location of the chlorinated VOCs most frequently detected above criteria (PCE, TCE, and vinyl chloride). The chlorinated VOC detections in soil are generally associated with former dip tanks or solvent USTs and where groundwater contamination has been identified: in RU-C1 near Building 231 and 253, RU-C2 near Buildings 258 and 251, RU-C4 in or near Buildings 272 and 281, and RU-C5 in or near Building 134. DCA was detected at RU-C5 and DCB is present at RU-C5 and RU-C2.

Benzene detections are associated primarily with the former foundry, Building 241, as shown on Figure 2-21. Benzene has historically been identified as a risk driver in soil at Parcel C (PRC, LFR, and U&A 1997; Tetra Tech and Washington Group International 2002). Although not a risk driver in this area, benzene was also detected in soil at concentrations exceeding criteria near the former fuel station location by Building 253.

Naphthalene in soil is consistently detected in areas associated with fuel or petroleum releases; PAHs are nearly always detected in the same areas as naphthalene.

2.3.1.3 Semivolatile Organic Compounds

In total, 2,154 soil samples were analyzed for SVOCs at Parcel C, with analysis for 72 chemicals. Twelve SVOCs were determined to be COCs in the revised HHRA: 2-methylnaphthalene, 3,3'-dichlorobenzidine, benzo(a)anthracene, benzo(a)pyrene, benzo(b)-fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, chrysene, dibenz(a,h)anthracene, hexachlorobenzene, indeno(1,2,3-cd)pyrene, and n-nitroso-di-n-propylamine.

The seven PAHs—benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene—were detected at most frequently of the SVOCs, with benzo(a)pyrene detected in more than 25 percent of the samples. These COCs are associated with the fuel lines, fuel tanks, and industrial activities.

Figure 2-22 shows the location of benzo(a)pyrene results exceeding screening criteria. Benzo(a)pyrene is considered representative of the PAHs because of its high frequency of detection and its toxicity. PAHs are widespread across Parcel C. Benzo(a)pyrene and other PAHs have historically been identified as risk drivers in soil at Parcel C (PRC, LFR, and U&A 1997; Tetra Tech and Washington Group International 2002).

The remaining five COCs were detected infrequently above residential RBCs. Bis(2-ethylhexyl)phthalate, a common laboratory contaminant, was detected three times above the RBC; the other COCs were only detected once above residential RBCs.

2.3.1.4 Pesticides and Polychlorinated Biphenyls

In total, 631 soil samples were analyzed for pesticides, with analysis for 23 chemicals. Four pesticides—dieldrin, gamma-benzene hexachloride (BHC), heptachlor epoxide, and heptachlor epoxide b were identified as COCs in the HHRA (see Appendix C). However, all of these pesticides were detected in very few samples—approximately 1 or 2 percent of all samples tested for pesticides. Detections were typically estimated values below the PQL. Figure 2-23 shows the locations where detected pesticides exceed the PQL. Detections of COCs occurred in redevelopment blocks 10, 13, 18, and 23. These typically shallow detections do not appear to be associated with a particular type of industrial activity or spills and may be related to localized historic pesticide use.

In total, 1,545 soil samples were analyzed for PCBs in soil at Parcel C, with analysis for 7 chemicals. Aroclor-1254 and Aroclor-1260 were identified as COCs in the HHRA. Aroclor-1254 was detected in less than 2 percent of the samples analyzed. Aroclor-1260 is the most commonly detected PCB at HPS and was detected an order of magnitude more frequently than Aroclor-1254. Aroclors are associated with transformer sites and with spills. As shown on

Figure 2-24, PCBs were detected in fuel line or tank farm areas (redevelopment blocks 10 and 11), transformer sites (redevelopment blocks 23 and 24), and areas with industrial activities (redevelopment blocks 20A and 20B).

2.3.1.5 Cyanide

In total, 26 soil samples were analyzed for cyanide. Cyanide was not identified as a COC in the HHRA. Samples were collected in seven redevelopment blocks. Results indicated four detections of cyanide, with three detections at the detection limit, and the other detection at approximately twice the detection limit (0.16 mg/kg). These results indicate cyanide is not present at a sufficient mass in soil to be an ongoing source of contamination to groundwater.

2.3.1.6 Total Petroleum Hydrocarbons

In total, 2,015 soil samples were analyzed for various petroleum hydrocarbon constituents. Total TPH (TTPH) is the sum of hydrocarbon fractions. The screening criterion for TTPH in soil is the basewide criterion (3,500 mg/kg) developed in the Parcels C, D, and E Corrective Action Plan (CAP) (Tetra Tech and Washington Group International 2002; Navy 2004a). TPH was most frequently detected in the motor oil range (over 60 percent of samples) and infrequently detected in the gasoline range (11 percent of samples). TTPH concentrations exceeded the screening criterion in 10 of the 15 redevelopment blocks (see Figure 2-25). TPH is typically found near former USTs, fuel lines, and in areas of industrial activity. The fuel lines have been removed at Parcel C and former USTs have been either removed or closed-in-place. Residual TPH that remains will be addressed under the TPH program or as part of this report where TPH and COCs are commingled and the site is not planned to be addressed under the TPH program.

2.3.2 Nature and Extent of Soil Contamination by Redevelopment Block

COCs were selected for the 15 redevelopment blocks at Parcel C by determining those chemicals that exceed screening criteria. Table 2-11 provides a statistical summary of analytical results for the COCs at each redevelopment block; the table lists the frequency of detection, maximum detected concentration, and frequency of detection above screening criteria. Screening criteria are identified based on the planned reuse exposure scenario in the HHRA (residential, industrial, or recreational) in a given redevelopment block. For each COC, the screening criterion is the RBC unless the RBC is less than the HPAL or the PQL. The methodology for selecting screening criteria is the same as that used to develop remediation goals in Section 4.0. The nature and extent of COCs at each redevelopment block are summarized in Table 2-12. Table 2-12 provides the following information:

- A brief description of the redevelopment block
- Potential sources of soil contamination
- A list of COCs identified at the redevelopment block

- A summary of historical removal actions
- Recommendations

Because all redevelopment blocks have COCs, response action is planned in all blocks.

2.4 PARCEL C NATURE AND EXTENT OF GROUNDWATER CONTAMINATION

Thousands of groundwater samples have been analyzed for a variety of chemicals at Parcel C. Appendix B contains tables that list all groundwater analytical results for Parcel C monitoring wells and piezometers through 2004 and maps that identify all of the groundwater monitoring well locations. Groundwater flow directions may shift in the future from the directions presented in Section 2.2.8.3, since the pump at the lift station for storm sewer lines of Parcel C was shut down in May 2007. The groundwater flow directions and chemical distribution in groundwater should be reevaluated prior to preparing the remedial design.

The evaluation of the nature and extent of groundwater contamination focuses on:

- COCs, defined as those chemicals that may present an unacceptable risk to human health at Parcel C, as determined by the revised HHRA (see Appendix C and Section 3.1)
- COECs, defined as chemicals that may present an unacceptable risk to ecological receptors in the Bay, as identified during the screening evaluation of groundwater concentrations compared with surface water criteria (see Appendix G and Section 3.2)

Four RUs (C1, C2, C4, and C5) were identified at Parcel C to help focus the evaluation of groundwater contamination. Figure 2-26 shows the location of the RUs, as well as potential contaminant source areas. Table 2-13 lists the Parcel C groundwater monitoring wells, associated RUs, and aquifers.

The Navy developed statistical tables for chemicals analyzed at Parcel C to focus the evaluation on the most significant groundwater contamination at Parcel C. Table 2-14 provides the statistics for all chemicals analyzed in A-aquifer groundwater at Parcel C. Table 2-15 provides statistics for all chemicals analyzed in B-aquifer groundwater at Parcel C. Table 2-16 provides statistics for all chemicals analyzed in the F-WBZ groundwater at Parcel C. Table 2-17 provides statistical summaries, organized by RU, for both COCs and COECs identified for Parcel C.

Based on the beneficial use evaluation for groundwater at HPS (see Appendix A), the B-aquifer exposure pathways are not considered complete for human health except at RU-C5; therefore, no COCs were identified for the B-aquifer except at RU-C5. Similarly the exposure pathway for the shallow F-WBZ is not considered complete for human health. No COCs were determined in the deep F-WBZ. As a result, the nature and extent of COCs in B-aquifer and F-WBZ groundwater is not discussed further in the summary sections below, except at RU-C5. Table 2-18 provides summary statistics for the COCs identified for the domestic use exposure pathway.

The following subsections summarize the nature and extent of A-aquifer groundwater contamination by RU, followed by a subsection summarizing data for wells not located within an RU. Each RU has a unique list of COCs and COECs. Both were developed based on the area-specific analysis. The planned reuse also affects the determination of COCs from the vapor intrusion pathway.

2.4.1 Remedial Unit C1 Groundwater Summary

RU-C1 is located in the eastern portion of Parcel C and covers portions of redevelopment blocks COS-2, COS-3, 20B, 22, 24, and 25. This area was formerly referred to as IR-28, and includes Buildings 231, 211, 218, 219, and 253. The location of RU-C1 is shown on Figure 2-26.

Buildings 218 and 219 are located next to each other. Building 218 was used as a latrine, and no actions have been taken at that building (Tetra Tech FW, Inc. 2004). Building 219 was an electrical substation that housed six PCB-containing transformers, three 55-gallon drums of PCB-containing oil, six cardboard drums of unknown solids, and miscellaneous electrical equipment. A sump was also located on the north exterior of the building. The primary concerns at Building 219 were the PCB-containing transformers and the sump (PRC 1997).

Buildings 211 and 253 were used for machining, welding, assembly, painting, repair, and fabrication of a variety of electronic, optical, and ordnance-related equipment. The buildings share a common production floor, one large and two small paint booths, two large dip tanks, one large vapor degreaser, resin impregnation tanks, and a parts washer. Two sumps are located inside Building 253. Nine former USTs are associated with Buildings 211 and 253; these tanks were removed between 1991 and 1993 (PRC 1994a). The tanks primarily stored gasoline and diesel fuel, although results for samples from some of the tanks also indicated they stored solvents (Tetra Tech 2004a).

Building 231, located immediately north of Buildings 211 and 253 and south of Dry Dock 2, was historically used for heavy industrial machining. The building housed several air treatment systems, sumps, sandblasting rooms, a boiler, and subfloor trenches and piping. Five former USTs are located north and east of Building 231; three of these were removed in 1991 and the remaining two were closed in place. The tanks stored diesel and fuel oil (Tetra Tech 2004a).

Ten COCs were identified for RU-C1: 1,1-DCA, 1,2 DCE, 1,4-DCB, benzene, chloroform, cis-1,2-DCE, naphthalene, PCE, TCE, and vinyl chloride. Chromium VI and zinc were identified as COECs in A-aquifer groundwater at RU-C1 based on potential effects to the Bay. Table 2-17 provides RU-C1-specific summaries for both COCs and COECs.

Figures 2-27 through 2-30 show the maximum detected concentrations of PCE, TCE, cis-1,2-DCE, and vinyl chloride, respectively, for samples collected in 2004 in RU-C1. Concentration contours shown on these figures were developed considering reported analytical results of groundwater samples collected from 1990 to the second quarter 2007.

PCE concentrations have historically been as high as 220 to 380 micrograms per liter (µg/L) in RU-C1, with the highest concentrations detected in samples collected from IR28MW127A (located north of Building 231) and IR28MW338A (located in the south-central portion of Building 231). The areal extent of PCE in groundwater at RU-C1 is shown on Figure 2-27.

TCE concentrations have historically been as high as 25 to 78 µg/L in RU-C1, with the highest concentrations detected in samples collected from a group of wells located north of the sumps in the former cleaning and spray paint rooms in Building 253 and from wells IR28MW354A and IR28MW128A located to the north along Spear Avenue south of Building 231. Another cluster of wells with TCE above 10 µg/L occurs in the southeast portion of Building 231. The areal extent of TCE in groundwater at RU-C1 is shown on Figure 2-28.

Cis-1,2-DCE concentrations have historically been as high as 1,000 to 2,000 µg/L in RU-C1, with the highest concentrations detected in samples collected from well IR28MW151A (located just north of the sumps in the former cleaning and spray paint rooms in Building 253). The areal extent of cis-1,2-DCE in groundwater at RU-C1 is shown on Figure 2-29.

Vinyl chloride concentrations have historically been as high as 120 to 680 µg/L in RU-C1, with the highest concentrations detected in samples collected from IR28MW919A (located north of the sumps in Building 253) and IR28MW136A (located in the south-central portion of Building 231). The areal extent of vinyl chloride in groundwater at RU-C1 is shown on Figure 2-30.

VOCs (PCE, TCE, 1,2-DCE, vinyl chloride and chlorobenzene) have been reported in only one B-aquifer well located within RU-C1. The detections are reported in well IR28MW314B which is located within the eastern portion of Building 231. VOC concentrations in the B-aquifer are one to two orders of magnitude lower than the concentrations reported in the overlying A-aquifer. This location is near the edge of the B-aquifer and has TDS of greater than 10,000 mg/L. VOCs have not been reported in any other B-aquifer wells within RU-C1, nor within any F-WBZ wells in this area.

TPH is addressed under a separate program rather than under CERCLA, although TPH may be addressed in conjunction with CERCLA remediation at some sites were it is collocated with CERCLA hazardous substances. The upcoming Parcel C TPH CAP will address TPH at Parcel C. As documented in the Parcels C, D, and E CAP (Tetra Tech 2002b), the Navy developed two groundwater criteria to protect the Bay from petroleum contamination. One criterion provides specific limits for dissolved-phase TPH concentrations in groundwater as a function of distance from the shoreline (see Appendix G). The second criterion developed by the Navy is the removal of any recoverable free product encountered, regardless of its location. Recoverable free product is defined as any measurable thickness of free product (Tetra Tech 2002b). Light nonaqueous-phase liquid (LNAPL) has been reported at RU-C1 (near the boundary of redevelopment blocks 22 and 25), as discussed in Appendix G. Reported LNAPL measurements are provided below.

Well	Reported Thickness (feet)	Date
IR28MW129A	Reported as visual and not measured	11/02/1995
	>1	6/4/ 2000
	13.05	8/1/2002
	>1 and viscous	2/16/2007
IR28MW353A	0.02	4/2000
	0.02	8/9/2002

Source: (Tetra Tech 2002b; CE2 Kleinfelder 2007).

The appearance of viscous LNAPL in 2000 at IR28MW129A may be a function of movement along preferential pathways below the surface. The source of the LNAPL at this well may be related to either industrial activities in Building 231 or one of the former USTs, located north of Building 231 that contained diesel. However, LNAPL has never been observed in well IR28MW155, which is closer to the USTs than IR28MW129A. LNAPL will be addressed under the TPH program. However, LNAPL may be addressed in conjunction with alternatives developed in this report if the technology designed to remediate other COCs also remediates LNAPL. For example, in areas where excavation is planned and LNAPL is present, the excavation would be designed to also remove the LNAPL.

Chromium VI and zinc were detected at RU-C1, at concentrations exceeding surface water criteria (Appendix G). Chromium VI concentrations at well IR28MW125A, adjacent to Dry Dock 2, ranged from 10 µg/L to 260 µg/L. Zinc was detected inconsistently at two wells (IR28MW124A and IR28MW126A) in RU-C1. Sources of chromium VI and zinc in soil were not identified during the RI or during subsequent investigations. Industrial activities at Buildings 231 and 253 are potential sources of contamination.

2.4.2 Remedial Unit C2 Groundwater Summary

RU-C2 is located in northwestern Parcel C and covers portions of redevelopment blocks 20A, 20B, and 24; portions of IR-28 and IR-58; and all or part of Buildings 251, 252, 258, and 281, as shown on Figure 2-26.

Building 251 housed a paint stripping operation and was used as a tool storage area and an industrial relations office. Dip tanks and sumps are located in the northern portion of the building. The dip tanks contained TCE that was used to strip paint from metal. A paint room in the north-central portion of the building contains floor sumps that were used for compressed-air spray painting. A solvent dispenser pump was located in the southeastern corner of this room. The eastern third of the building was used for storage and office space.

Building 258 was historically used as a pipe manufacturing facility where sulfuric, chromic, and hydrochloric acids, sodium hydroxide, and degreasing solvents were used. On the eastern side of the building, facing Building 251, the roof overhangs a former open pickling and degreasing operation. Eleven concrete and metal dip tanks and their associated drainage sumps were located here. The tanks were removed in 2001 (IT Corp. 2001a).

Twenty-three COCs (all VOCs) were identified for A-aquifer groundwater at RU-C2 based on the revised HHRA (Appendix C). No COECs were identified for A-aquifer groundwater at RU-C2 based on potential effects to the Bay (see Appendix G). Table 2-17 provides RU-C2-specific summaries for COCs.

Figures 2-31 through 2-37 show the maximum detected concentrations of PCE, TCE, cis-1,2-DCE, and vinyl chloride, 1,4-DCB, chlorobenzene and carbon tetrachloride, respectively, for samples collected in 2003 and 2004 in RU-C2. Concentration contours shown on these figures were developed considering reported analytical results of groundwater samples collected from 1990 to the second quarter 2007.

The highest concentration of PCE that has been detected in groundwater samples collected at RU-C2 is 140 µg/L. This concentration was detected in a sample collected from well IR28MW32B located northeast of Building 251 in 2005. Other samples from this well exhibited lower PCE concentrations of 16 and 23 µg/L. The areal extent of PCE in groundwater at RU-C2 is shown on Figure 2-31.

The highest concentration of TCE that has been detected in monitoring well samples collected from the A-aquifer at RU-C2 is 40 µg/L. This concentration was detected in a groundwater sample collected from well IR28MW300F in 1996 and in two samples collected from well IR28MW911A in 2001. TCE concentrations detected in groundwater samples collected from well IR28MW300F had decreased to 12 µg/L in 2004. As shown on Figure 2-28, TCE has been detected near both the sump and dip tank area (Building 251) and the pickling and degreasing operations (Building 258). TCE is currently present in both the Building 251 paint stripping area and the Building 258 pickling and degreasing operation area; the TCE plume has a greater areal extent than the cis-1,2 DCE and vinyl chloride plumes.

The highest concentration of cis-1,2-DCE that has been detected in monitoring well samples collected from the A-aquifer at RU-C2 is 3,600 µg/L. This concentration was detected in a groundwater sample collected from well IR58MW31A in 1998. This well is located north of Building 251, near the paint stripping area and a former solvent tank. Cis-1,2-DCE concentrations detected in samples from this well in 2004 ranged from 24 µg/L to 58 µg/L. The highest concentration of cis-1,2-DCE reported from sampling in 2004 is 230 µg/L. This high concentration was in a sample from well IR58MW33B, which is screened in both the A- and B-aquifers and located next to well IR58MW31A (see Figure 2-33).

The highest concentration of vinyl chloride that has been detected in monitoring well samples collected from the A-aquifer at RU-C2 is 1,700 μg/L. This concentration was detected in a groundwater sample collected from well IR58MW31A in September 2004. The areal extent of vinyl chloride in groundwater at RU-C2 is shown on Figure 2-34.

High concentrations, ranging from 110 to 940 μg/L, of 1,4-DCB have been detected in monitoring well samples collected from the A-aquifer at RU-C2. These concentrations were detected in groundwater samples collected from wells IR28MW909A, IR28MW911A, IR58MW31A, IR58MW35A, and IR28MW914A since 2000. These wells are located north of the Building 251 sump and dip tank area. The areal extent of 1-4-DCB in groundwater at RU-C2 is shown on Figure 2-35.

The highest concentration of chlorobenzene that has been detected in groundwater samples collected from the A-aquifer at RU-C2 is 9,900 μg/L. This concentration was detected in a sample collected from well IR28MW909A in 2001. High concentrations above 1,000 μg/L were also reported in samples from well IR58MW31A in 2004 and wells IR28MW914A and IR28MW911A in 2001. The areal extent of chlorobenzene is shown on Figure 2-36.

High concentrations, ranging from 150 to 400 μg/L, of trichlorofluoromethane (Freon 11) have been detected in samples collected from one monitoring well in the A-aquifer at RU-C2. These concentrations were detected in groundwater samples collected from well IR28MW188F, since 2002. This well is located northwest of Building 258 (Figure 2-26).

At this same well (IR28MW188F), high concentrations, ranging from 14 to 46 μg/L, of carbon tetrachloride have been detected in samples since 2000. High concentrations above 20 μg/L were also reported in samples from well IR28MW190F in 2004. Carbon tetrachloride has also been detected in well IR28MW397B east of Building 251 at concentrations ranging from 2 to 11 μg/L, and immediately north of Building 251 in well IR58MW31F ranging in concentrations from 0.76 to 5.4 μg/L. The estimated areal extent of carbon tetrachloride is shown on Figure 2-37.

VOCs (PCE, TCE, 1,2-DCE, vinyl chloride, and chlorobenzene) have been reported in several wells in the B-aquifer within RU-C2. The detections are reported in wells IR58MW33B, IR58MW32B, IR28MW397B, and IR28MW299B which are about the former sumps in and near Building 251. VOC concentrations in the B-aquifer are one to three orders of magnitude lower than the concentrations reported in the overlying A-aquifer. This location is in an area where the B-aquifer and A-aquifer are hydraulically, vertically interconnected. TDS concentrations in the B-aquifer in this area range from 1,370 to 9,770 mg/L.

PCE, TCE, cis-1,2-DCE and chlorobenzene have been reported at low concentrations (ranging from <0.5 to 12 μg/L) in wells IR28MW188F, IR28MW189F, IR28MW190F, IR28MW216F and IR28MW300F at RU-C2. These wells are located about Building 258 where the water table is within the F-WBZ. TDS concentrations in this area range from 700 to 4,160 mg/L.

Chromium VI, chromium, and zinc were not detected at concentrations above screening criteria at RU-C2.

2.4.3 Remedial Unit C4 Groundwater Summary

RU-C4 is located in southwestern Parcel C in IR-28, and covers portions of redevelopment blocks 18, 23, 24, 26, and COS-3. RU-C4 includes portions of a large number of buildings, including Buildings 270, 271, 272, and 281. The location of RU-C4 is shown on Figure 2-26.

Building 272 was the riggers shop. A sump located in the northeastern corner of Building 272 formerly drained into an oil and grease trap in the alley between Buildings 272 and 281. Building 281, identified as the Electronics-Weapons Precision Facility Machine Shop, contained a paint room with five steel dip tanks.

Two USTs containing solvents were removed (HPA-33 and HPA-34) from outside the north side of Building 281, and one UST (HPA-07) containing waste oil was removed from the southwest side of Building 281, in the alley between Buildings 281 and 272 (PRC 1994a). One additional UST was located in the RU-C4 vicinity, between the south end of Buildings 270 and 271, east of Building 272. Tank S-215 had contained paint thinner and was closed in place in 1991 (PRC 1994a).

Fifteen COCs were identified for the groundwater of the A-aquifer and F-WBZ at RU-C4 based on the revised HHRA (see Appendix C), and no COECs were identified for the groundwater of the A-aquifer and F-WBZ at RU-C4 based on potential effects to the Bay. Table 2-17 provides RU-C4-specific summaries for COCs. The impacts to groundwater occur in the area of Building 272 and the western portion of Building 281. The plume is principally in the F-WBZ but extends into the A-aquifer along the eastern portions of the plume. The sumps and dip tanks which constitute the source areas for these plumes are within the areas of both the F-WBZ and the A-aquifer. The RU-C4 plume approaches the western limit of the B-aquifer near Building 271, but generally, the B-aquifer does not exist within the RU-C4 plume area. TDS concentrations in the F-WBZ and A-aquifer in this area range from 200 to 24,800 mg/L, with the higher TDS levels being in the A-aquifer. The B-aquifer in the area of Building 271 has a TDS concentration in the range of 11,000 mg/L.

Figures 2-31 through 2-35 and 2-37 and 2-38 show the maximum detected concentrations of PCE, TCE, cis-1,2-DCE, vinyl chloride, 1,4-DCB, carbon tetrachloride, and 1,2-DCA, respectively, for samples collected in 2004 in RU-C4. Concentration contours shown on these figures were developed considering reported analytical results of groundwater samples collected from 1990 to the second quarter 2007.

Concentrations of PCE were detected at RU-C4 in monitoring well samples collected from wells IR28MW407and IR28MW360F at 270 and 140 μg/L, respectively, during 2002 and 2003. However, since that time PCE concentrations in wells in this area have decreased to between

5 and 30 μg/L. These wells are located in the northeast portion of Building 272 and south of Building 281. The areal extent of PCE in groundwater at RU-C4 is shown on Figure 2-31.

TCE has been detected in approximately 200 samples collected from the A-aquifer at RU-C4. As shown on Figure 2-32, the highest concentrations in 2003 and 2004 were reported in samples from wells located at the northern end of Building 272, with the TCE plume extending southward and slightly eastward. This plume is near the former floor drain and cleanout, which drained into an oil and grease trap and an underground tank in the alley between Building 272 and Building 281. At the southern edge of the plume, a concentration of 0.99 μg/L was reported during the June 2004 sampling event in a sample from well IR28MW272A. This well is approximately 80 feet from San Francisco Bay. The highest TCE concentration historically reported at RU-C4 is 76,000 μg/L, which was detected in a sample collected in November 2002 from well IR28MW211F. In 2004, TCE concentrations from three sampling events of this well ranged from 6.7 to 150 μg/L. Figure G-8 in Appendix G shows the trend of concentrations of TCE. The highest TCE concentration reported during 2003 to 2004 is 4,300 μg/L in well IR28MW407 (see Figure 2-32). In general, TCE concentrations have been decreasing in samples from the source area at the north end of Building 272. The treatability studies completed at RU-C4 have contributed to the reduction in concentrations of TCE.

Cis-1,2-dichloroethene, a degradation product of TCE, has been detected in 184 samples from the A-aquifer at RU-C4. The highest cis-1,2-DCE concentration (2,600 μg/L) was detected in 2003 at IR28MW407. During the sampling events in 2001 and 2002, cis-1,2-DCE was detected at concentrations ranging from 0.18 μg/L to 1,000 μg/L (detected in IR28MW211F). The highest detected cis-1,2-DCE concentration (1,200 μg/L) in 2004 was collected from IR28MW211F. The areal extent of cis-1,2-DCE in groundwater at RU-C4 is shown on Figure 2-33.

Vinyl chloride has been detected in samples from several wells, with the highest concentrations historically detected in samples from wells IR28MW407 and IR28MW211F. Figure 2-30 shows isoconcentration contours for the maximum vinyl chloride concentrations detected in 2003 and 2004 at RU-C4. The highest concentration detected was 440 μg/L. This concentration was detected in a sample collected in September 2003 from well IR28MW407. Samples from this well were also collected in 2004, with vinyl chloride concentrations ranging from 27 to 140 μg/L. Samples collected in 2004 from well IR28MW211F had vinyl chloride concentrations ranging from 6.5 to 52 μg/L. Compared with TCE and cis-1,2 DCE, vinyl chloride has the smallest areal extent and is currently present at the lowest concentrations.

The highest concentration of 1,4-DCB that has been detected in groundwater samples collected from RU-C4 is 50 μg/L. This concentration was detected in a sample collected from well IR28MW407 in 2004. This well is located between Buildings 272 and 281. The areal extent of 1,4-DCB in groundwater at RU-C5 is shown on Figure 2-35.

The highest concentration of carbon tetrachloride that has been detected in groundwater samples collected from RU-C4 is 520 μg/L. This concentration was detected in a sample collected from well IR28MW937F in 2001. This well is located in the northern portion of Building 272. The concentration of carbon tetrachloride at RU-C4 was significantly reduced by the treatability study conducted in 2002. Current carbon tetrachloride concentrations range from 0.5 to above 10 µg/L in the north central area of Building 272. The estimated areal extent of carbon tetrachloride in groundwater at RU-C54 is shown on Figure 2-37.

The high concentrations of 1,2-DCA that have been detected in groundwater samples collected from RU-C4 ranged from 150 to 270 µg/L. These concentrations were detected in a sample collected from wells IR28MW410A, IR28MW409, and IR28MW408 between 2003 and 2005. These wells are located in the area between Buildings 272 and 281 near the floor drain cleanouts, former oil traps, and sumps. The areal extent of 1,2-DCA in groundwater at RU-C4 is shown on Figure 2-38.

Benzene was detected in groundwater samples collected from RU-C4 at concentrations ranging from 0.2 to 64µg/L. The highest detections were in the vicinity of Building 272. Because benzene was been detected in soil samples collected in the vicinity of Building 241, four groundwater wells were installed and sampled around Building 241 in 2002. Concentrations detected in three of these wells ranged from 0.1 to 6.4µg/L; benzene was not detected in the other well. Benzene was not detected in two subsequent rounds of sampling at the well with the highest concentration (IR30MW04F).

Chromium VI and zinc were not detected at concentrations above screening criteria at RU-C4.

2.4.4 Remedial Unit C5 Groundwater Summary

RU-C5 is located in northern Parcel C in IR-25 and IR-06, and covers portions of redevelopment blocks 10 and 11. RU-C5 includes Buildings 134 and extends slightly into Building 123 in Parcel B. The location of RU-C5 is shown on Figure 2-26. There are two groundwater plumes within RU-C5. The northern plume is in area IR25 and is associated with the sumps and separator in and near Building 134. The south plume is in area IR-06 and is associated with the tank farm and the related pipe lines. The water table at the IR-06 area is within both the A-aquifer and the F-WBZ. Analytical data shows the IR-06 is at significantly lower concentrations than the northern plume and is likely biodegrading.

Building 134 has contained offices, machine shops, a refrigeration repair shop, an industrial quality and reliability assurance laboratory, and storage facilities. A dip tank labeled "chlorinated materials" was built into the foundation and drained to a sump partially inside and partially outside of the building (PRC and others 1996). An oil and water separator that connects to the sump drains was located outside of Building 134. Sludge and oily waste were observed in the dip tank and sump in 1991; both the dip tank and sump have been removed. In one area of the machine shop, floor tile was observed saturated with, and deformed by, oil and corrosive material. A utility vault is present in the southwestern exterior of the building. Fuel distribution lines passed beneath the central part of Building 134; these lines have been removed. Fuel lines adjacent to the north and east of Building 134 were removed during removal actions at Parcel B in 2001.

Adjacent to Building 134 to the southwest was a fuel tank farm at IR-06. The 16 ASTs and two pumphouse buildings were removed in 1993 (PRC 1996a). Subsequent excavations of this area and the fuel lines from the former tank farm to IR-25 were completed during Parcel B removal actions.

An SVE system was installed and operated inside Building 134 in 2001. The cumulative VOC mass removal rate was between 0.05 and 0.12 pounds per day (IT Corp. 2001b). VOC vapors removed consisted of Freon-11 (trichlorofluoromethane), PCE, TCE, toluene, and xylenes. An anaerobic-aerobic sequential in-situ bioremediation (ISB) treatability study was conducted in the area of the former dip tank and sump in 2004 and 2005 (Shaw Environmental, Inc. 2005). Complete degradation of chlorinated ethenes was observed during the anaerobic stage. Reductive dechlorination of 1,2-DCB and 1,4-DCB to chlorobenzene was also observed. The injection of sodium lactate was hampered by low hydraulic conductivity soils, and thus was supplemented with hydrogen gas. The biodegradation of chlorobenzene and nonchlorinated organic chemicals was accomplished by the injection of oxygen. Low hydraulic conductivity soils hampered the delivery of oxygen, resulting in limited treatment areas. The study did not evaluate the potential for rebounding of chemical concentrations, which may occur.

The former dip tank and sump are the primary sources of solvents detected in groundwater at RU-C5. The former tank farm, fuel lines, dip tank, and machine shop operations are sources for metals, SVOCs, pesticides, PCBs, and petroleum hydrocarbons. Some metals also occur naturally in soils and bedrock at the site. A sample collected from the sludge in the sump area during the site investigation exhibited high concentrations of pentachlorophenol, as well as other VOCs, PCBs, and TPH (PRC 1994d). The sludge was later removed from the pit, and the dip tank and sump were cleaned (PRC 1996b). Results of subsequent soil samples collected when the sump was removed were nondetect for pentachlorophenol (Shaw Environmental, Inc. 2004).

Twenty COCs (all VOCs) were identified for A-aquifer groundwater at RU-C5 based on the HHRA (see Appendix C), and one COEC (chromium VI) were identified for A-aquifer groundwater at RU-C5 based on potential effects to the Bay (see Appendix G). Table 2-17 provides RU-C5-specific summaries for both COCs and COECs. At RU-C5, COCs were also developed for domestic use exposure for groundwater in the B-aquifer because the Water Board has not concurred with the Navy's determination that the B-aquifer is not a source of drinking water. Table 2-18 provides summary statistics for the COCs for the domestic use exposure at RU-C5.

In 2002, dense nonaqueous-phase liquid (DNAPL) was observed in RU-C5 near wells IR25MW15A2 (located about 5 feet east of IR25MW15A1), IR25MW19A, and IR25MW902B. Analysis of the DNAPL product collected from IR25MW19A indicated the presence of multiple VOCs dominated by PCE and chlorobenzene. During the 2004 RU-C5 treatability study, DNAPL was observed in a direct push monitoring point adjacent to IR25MW54A. The monitoring probe was installed to measure dissolved oxygen and other field parameters (Shaw Environmental, Inc. 2005). The presence of pockets of DNAPL at RU-C5 in the vicinity of IR25MW54A is consistent with the treatability results in this well area. Significant reductions in concentrations of VOCs in this well area during the treatability study were not achieved, likely because of the presence of DNAPL in soil. Results of current groundwater monitoring have not identified any DNAPL (CE2-Kleinfelder 2007).

Figures 2-39 through 2-47, respectively, show the maximum detected concentrations of PCE, TCE, cis-1,2-DCE, vinyl chloride, 1,2-DCA, 1,4-DCB, 1,2-DCB, chlorobenzene and carbon tetrachloride for samples collected in 2004 in RU-C5. Concentration contours shown on these figures were developed considering reported analytical results of groundwater samples collected from 1990 to the second quarter 2007.

The highest concentration of PCE that has been detected in the A-aquifer at RU-C5 is 72,000 µg/L in a groundwater sample collected from well IR25MW19A in January 1998. The last sample collected from this well was in March 2001, and had a PCE concentration of 17,000 µg/L. PCE has been detected in 19 groundwater monitoring wells in RU-C5. The areal extent of the PCE plume to 0.5 µg/L is shown on Figure 2-31. Ten of the 15 groundwater monitoring wells are located within or outside Building 134 near the former dip tank and sump, and 4 of the 15 groundwater monitoring wells are located south of Building 134 near the former fuel tank farm.

The highest concentration of TCE that has been detected in the A-aquifer at RU-C5 is 18,000 µg/L in a groundwater sample collected from IR25MW19A in January 2001. Elevated concentrations of TCE have also been detected in groundwater samples collected from wells IR25MW15A1, IR25MW18A, and IR25MW902B. These four groundwater monitoring wells are the same wells that contain elevated PCE concentrations. TCE has been detected in 26 groundwater monitoring wells in RU-C5. The areal extent of the TCE plume shown on Figure 2-40 is nearly coincident with the PCE plume.

The highest concentration of cis-1,2-DCE that has been detected in the A-aquifer at RU-C5 is 58,000 µg/L in a groundwater sample collected from IR25MW15A1 in February 1998. Cis-1,2-DCE concentrations in groundwater samples collected from IR25MW15A1 remained elevated in the early 2000s, varying between 27,000 µg/L and 46,000 µg/L. Elevated concentrations of cis-1,2-DCE have also been detected in groundwater samples collected from IR25MW18A, IR25MW19A, and IR25MW902B. These are the same four groundwater monitoring wells that contain elevated PCE and TCE concentrations. Cis-1,2-DCE has been detected in 32 groundwater monitoring wells in RU-C5, primarily located within or outside Building 134 near the former dip tank and sump, or south of Building 134 near the former fuel tank farm. The areal extent of the cis-1,2-DCE plume is shown on Figure 2-41.

The highest concentration of vinyl chloride that has been detected in the A-aquifer at RU-C5 is 6,600 µg/L in a groundwater sample collected from IR25MW15A1 in October 1995. Vinyl chloride concentrations in IR25MW15A1 declined by the early 2000s, varying between 1,600 µg/L and 3,200 µg/L. Elevated concentrations of vinyl chloride are generally found in the same groundwater monitoring wells as PCE and TCE, plus in groundwater monitoring wells IR06MW59A1 and IR06MW59A2. Vinyl chloride has been detected in 25 groundwater monitoring wells in RU-C5. Nine of the groundwater monitoring wells are located within or outside Building 134 near the former dip tank and sump, and six of the groundwater monitoring wells are located south of Building 134 near the former fuel tank farm. The areal extent of the vinyl chloride plume is shown on Figure 2-42.

High concentrations, ranging from 2,120 to 54,000 μg/L, of 1,2-DCA have been detected in groundwater samples collected from the A-aquifer at RU-C5. These concentrations were detected in samples collected from wells about the degreaser pits and separator in Building 134. These are the same wells that have high concentrations of PCE and TCE at Building 134. The areal extent of 1,2-DCA in groundwater at RU-C5 is shown on Figure 2-43.

High concentrations, ranging from 2,120 to 13,000 μg/L, of 1,4-DCB have been detected in groundwater samples collected from the A-aquifer at RU-C5. These concentrations were detected in samples collected from wells about the degreaser pits and separator in Building 134. The areal extent of 1,4-DCB in groundwater at RU-C5 is shown on Figure 2-44.

High concentrations, ranging from 4,300 to 39,000 μg/L, of 1,2-DCB have been detected in groundwater samples collected from the A-aquifer at RU-C5. These concentrations were detected in samples collected from wells about the degreaser pits and separator in Building 134. The areal extent of 1,2-DCB in groundwater at RU-C5 is shown on Figure 2-45.

High concentrations, ranging from 110 to 3,970 μg/L, of chlorobenzene have been detected in groundwater samples collected from the A-aquifer at RU-C5. These concentrations were detected in samples collected from wells about the degreaser pits and separator in Building 134. The areal extent of chlorobenzene in groundwater at RU-C5 is shown on Figure 2-46.

High concentrations, ranging from 510 to 5,900 μg/L, of trichlorofluoromethane (Freon 11) have been detected in samples collected from one monitoring well in the A-aquifer at RU-C5. These concentrations were detected in groundwater samples collected from well IR25MW52A since 2002. This well is located north of Building 134 (Figure 2-26).

The highest concentration of carbon tetrachloride that has been detected in groundwater samples collected from RU-C5 is 28 μg/L from well IR06MW55F in 1993. This well is located in the eastern portion of IR06. Detections of carbon tetrachloride in this area in 2007 and 2008 are less than 1 μg/L at IR06MW55F and between 4 and 5 μg/L at IR06MW54F. A concentration of 13 μg/L was reported for samples collected in 2005 from wells IR25MW53A, IR25MW56A, and IR25MW902B from about the sump location in the north end of Building 134. A concentration of 11 μg/L was detected during May 2007 in a sample from well IR06MW59A1; analyses of samples from this well both before and since have not detected carbon tetrachloride. The estimated areal extent of carbon tetrachloride in groundwater at RU-C5 is shown on Figure 2-47.

LNAPL has been historically reported at RU-C5, as discussed in Appendix G and shown in the table below. Residual LNAPL will be addressed under the TPH program.

Well	Reported Thickness (feet)	Date
IR25MW11A	Reported as visual and not measured	11/02/1995
	0.2	8/15/2000
	0.25	11/21/2006
IR25MW19A	Reported as visual and not measured	03/31/2001
IR25MW22A	Reported as visual and not measured	08/16/2000
IR25MW11A	Reported as visual and not measured	11/02/1995

In 2006, CE2 Corporation prepared a technical memorandum to document the further delineation of subsurface contamination at RU-C5. The investigation used passive gas sampling, hydropunch groundwater sampling, and monitoring well sampling to assess the lateral extent of dissolved-phase VOCs in shallow groundwater (the A-aquifer) along the boundary between Parcels B and C near RU-C5. Also, the investigation assessed whether dissolved-phase VOCs from RU-C5 had migrated across the boundary into Parcel B and delineated the resulting lateral extent in shallow groundwater in Parcel B. Lastly, the investigation evaluated the lateral extent of VOCs as DNAPLs, if present.

The investigation concluded dissolved-phase VOCs have migrated into Parcel B from Parcel C in the A-aquifer at some shallow hydropunch® sampling locations. The concentrations detected along the Parcel B/C boundary were low and did not exceed California MCLs. The concentrations of chemicals detected in deep groundwater samples collected at the interface between the unconsolidated sediments and bedrock were low, did not exceed California MCLs, and are not indicative of the presence of DNAPLs at the sampling locations. The data did not indicate migration of DNAPLs along the bedrock to the sampling locations. The technical memorandum recommended no additional site investigation work is needed to delineate subsurface contamination near the Parcels B and C boundary, but that additional wells should be considered for inclusion in the basewide groundwater monitoring program (CE2 Corporation 2006).

Unfortunately, the designation in the names of some wells at RU-C5 does not accurately designate in which groundwater unit the wells are completed. The 900-series treatability study wells that were installed in 2000 at Building 134 were in some cases mislabeled with the wrong unit designation. PCE at 1.1 μg/L and 1,2-dichlorobenzene at 2.9 μg/L have been reported in B-aquifer well IR25MW38B. VOCs have not been reported in B-aquifer wells IR25MW37B, IR25MW39B, and IR25MW42B. No VOCs have been detected in F-WBZ well IR25MW15F.

Chromium VI has been detected consistently at RU-C5 near IR-06 at concentrations exceeding the surface water criterion (Appendix G). Historically, zinc has been detected infrequently at concentrations exceeding the surface water criterion. Sources of chromium VI and zinc in soil were not identified during the RI or during subsequent investigations.

COCs identified for domestic use exposure at RU-C5 are listed in Table 2-18. Most of these COCs are VOCs that are also identified as COCs for vapor intrusion exposure. COCs identified for domestic use only consist of VOCs (1,3 dichlorobenzene, 2-methylnaphthalene, 2-methylphenol), SVOCs(bis[2-ethylhexyl]phthalate, dibenzofuran, hexachloroethane), pesticides (aldrin, alpha-BHC, carbazole, dieldrin, heptachlor epoxide, heptachlor epoxide A) and metals (antimony, arsenic, chromium VI, iron, manganese and thallium).

Several of the COCs were identified based on the potential for contamination from the A-aquifer, but were not detected in the B-aquifer in the HHRA data set. The following wells are completed in the B-aquifer at RU-C5: IR25MW15A2, IR25MW41A, IR06MW59A2, IR25MW42B, IR25MW37B, IR25MW38B, IR25MW900B, IR25MW901B, IR25MW903B, IR25MW904B. The COCs that were not detected in these wells are aldrin, alpha-BHC, antimony, arsenic, bis(2-ethylhexyl)phthalate, carbazole, dieldrin, heptachlor epoxide A and hexachlorobenzene.

Of the VOCs that were identified as COCs for domestic use only, all were detected infrequently in the B-aquifer. 2-Methylphenol was detected only in 1994. 2-Methylnaphthalene was detected only once since 1994. 1,3 Dichlorobenzene was detected in three wells, with a maximum concentration of 62 μg/L in IR25MW901B in 2002.

None of the metal COCs detected in the B-aquifer were consistently detected above remediation goals. Chromium VI was detected once during the bioremediation treatability study just above the detection limit (11 μg/L), with chromium VI not detected in the subsequent sampling event. Manganese and thallium were detected at values below the HPAL since 1995. Iron was only detected below the remediation goal.

Similarly, pesticide and SVOC detections were infrequent and below remediation goals. Heptachlor expoxide A, the only pesticide detected in the B-aquifer, was detected only once very close to the detection limit and below the remediation goal. Dibenzofuran, the only SVOC detected in the B-aquifer, was detected in one well below the remediation goal.

2.4.5 Nonplume Wells Groundwater Summary

This section discusses areas of Parcel C that have not been classified as RUs. Contamination outside of the RUs is not attributed to known sources and not associated with contaminant plumes.

Three VOCs were identified as COCs in the A-aquifer for nonplume wells based on the potential for risk to human health from vapor inhalation (see Section 3.0). These chemicals are carbon tetrachloride, chloroform, and TCE. No COECs were identified for nonplume wells (see Appendix G). No COCs were identified for nonplume wells for the B-aquifer or the F-WBZ.

2.5 CONCEPTUAL SITE MODEL

This section presents the CSM for Parcel C. The CSM summarizes the likely sources of contamination to soil and groundwater, release mechanisms and transport pathways, exposure pathways, and receptors. The CSM identifies any potential ongoing sources of contamination.

A variety of potential sources of contamination at Parcel C has been identified, and most of these sources relate to former industrial activities in Parcel C (see Figure 2-27). Grouped according to the RUs in which they occur, these sources are as follows:

- RU-C1: The former paint spray and cleaning rooms in Building 253.
- RU-C1: The area around Building 231, which was used for heavy industrial machining.
- RU-C2: Dip tanks and sumps in Building 251, which were part of a paint stripping operation.
- RU-C2: Two former solvent tanks located north of Building 251.
- RU-C2: The pickling and degreasing area, located on the eastern side of Building 258. This area includes 11 concrete and metal dip tanks and associated drainage sumps.
- RU-C4: An oil and grease trap, a waste oil tank, and associated floor drains and sewer lines in the northern portion of Building 272.
- RU-C4: A sump and dip tank area located in the southern portion of Building 281.
- RU-C5: A sump and dip tank area located along the northwestern wall of Building 134, which extends to an oil and water separator located outside of the building.
- RU-C5: A former fuel tank farm, located southwest of Building 134.

There are no current tenants at Parcel C; ongoing sources to groundwater and soil are not anticipated.

The predominant type of groundwater contamination present in Parcel C is VOCs, primarily PCE, TCE, cis-1,2-DCE, and vinyl chloride. Discrete VOC groundwater plumes have been identified at Parcel C in each of the RUs, and these VOC plumes can be traced back to one of the sources identified above. DNAPL has historically been detected at RU-C5. LNAPL is present at one well at RU-C1.

Additionally, areas of concern for metals have been identified in groundwater at RU-C1 (chromium VI and zinc) and RU-C5 (chromium VI) at Parcel C.

In addition to these sources of contamination to groundwater, several sources of contamination to soil have been determined. Industrial operations, former fuel lines, and USTs are the significant sources of COCs in soil at Parcel C. In addition, use of abrasive sandblast materials and use of marine paints may also have contributed to metals contamination at Parcel C. Soil in some locations at Parcel C contains serpentinite, which may contain asbestos. Parcel C has 28 former USTs, more than any other parcel. These former tanks stored a variety of liquids, including boiler oil, diesel fuel, gasoline, solvents, waste oil, brine, or water (see Table 2-5).

The predominant chemicals in soil present at Parcel C are metals, PAHs, and petroleum-related compounds. Zinc contamination is associated with pickling operation at Building 258. Other metals were associated with the foundry at Buildings 241; however, this area was remediated in the 2001-2002 TCRA. Lead contamination has been detected that may be associated with fuel use or industrial activities. Metals are also associated with minerals in soil; these are ubiquitous across the site. PAHs and petroleum-related compounds are found in areas with former USTs or buildings where industrial operations where housed.

Other COCs are associated with spills or releases; these include PCBs and VOCs. VOC contamination in soil is associated with solvent use for industrial processes; VOC contamination in soil is generally located in areas where VOCs are found in groundwater as discussed above. The one significant exception is that benzene contamination is present in the vicinity of Building 241, the former foundry. PCBs are found in limited areas, apparently associated with transformers, particularly around Building 203. PCBs are also found in Building 251, likely associated with a former industrial activity.

A few samples of pesticides and SVOCs (other than PAHs) contained concentrations sufficient to be considered COCs. Pesticides may be associated with groundskeeping activities.

The Parcel C groundwater conceptual model consists of a multi-layered aquifer system with an upper unconfined A-aquifer, a laterally noncontinuous aquitard, a B-aquifer consisting of an upper semi-confined bed and deeper confined beds, and weathered, fractured bedrock lateral to both the A- and B- aquifers with a deeper fractured bedrock water-bearing zone. Groundwater in the upgradient bedrock provides the base flow for the aquifer system and contributes to the arsenic and metal concentrations in groundwater due to the serpentine in the bedrock and as crushed rock in the fill material. The serpentine is the primary source of arsenic and metals commonly found in groundwater at HPS. Additional recharge comes from precipitation. Connate groundwater may also occur in some structurally isolated pockets of the lower Undifferentiated Sediments and fractured bedrock. The bedrock is less porous and likely has a lower yield than the overlying unconsolidated material, although flow rate may be higher in the F-WBZ because of its fractured nature. Data on the bedrock groundwater flow dynamics are limited. As detailed in Appendix A, neither the A-aquifer, the B-aquifer, nor the F-WBZ are considered to have beneficial use as potential sources of municipal or domestic water supply.

The release mechanism for VOC and fuel-related contamination to soil and groundwater is spills and releases from the tanks, sumps, drains, former equipment, and piping, including potential leaks from storm drain lines. Although groundwater in the A-aquifer generally flows radially away from a topographic high in the northwest corner of the parcel, toward the shoreline, particularly to the east/southeast, groundwater flow at Parcel is locally complex. The heterogeneous material in the A-aquifer, as well as tidal influence from the proximity to the Bay, affects local groundwater flow. The widespread areas of contamination are related to the multiple sources at Parcel C as well as the complex groundwater flow.

In isolated areas, groundwater may vertically migrate between the A-aquifer and the B-aquifer because of the absence of the clay aquitard that normally occurs between these two units; however, in most areas where there is a potential for vertical flow, groundwater in both units is brackish to saline. At RU-C2, in the area of Building 251 and IR-58, both units have fresh water (TDS less than 3,000 mg/L), and monitoring data show VOCs occur in both groundwater units. Groundwater in the areas of RU-C1, RU-C2, and RU-C4 are isolated and cannot flow toward Parcels B, D, E, or E-2. Data indicate that in RU-C5 releases to groundwater have remained within the immediate area likely from the effects of a groundwater sink created by leakage to the sewer line at Building 134. The pump for the sewer line was shut down on May 1, 2007. As a result, groundwater flow may shift in the future, creating a potential for some impacted groundwater to migrate toward Parcel B. The B-aquifer in this area of Parcel C has a very limited extent, and the groundwater has been characterized as brackish to saline. In the adjacent area of Parcel B, the B-aquifer has a low production capacity and a limited extent.

Based upon the types of chemicals present at Parcel C and the media in which the chemicals are present, the following mechanisms for chemical transport have been identified for Parcel C:

- Volatilization of VOCs in soil and groundwater
- Transport of chemicals in soil by wind
- Leaching of chemicals from soil into groundwater
- Transport of metals in groundwater, with discharge to the Bay, and exposure of marine organisms
- Ingestion of homegrown produce

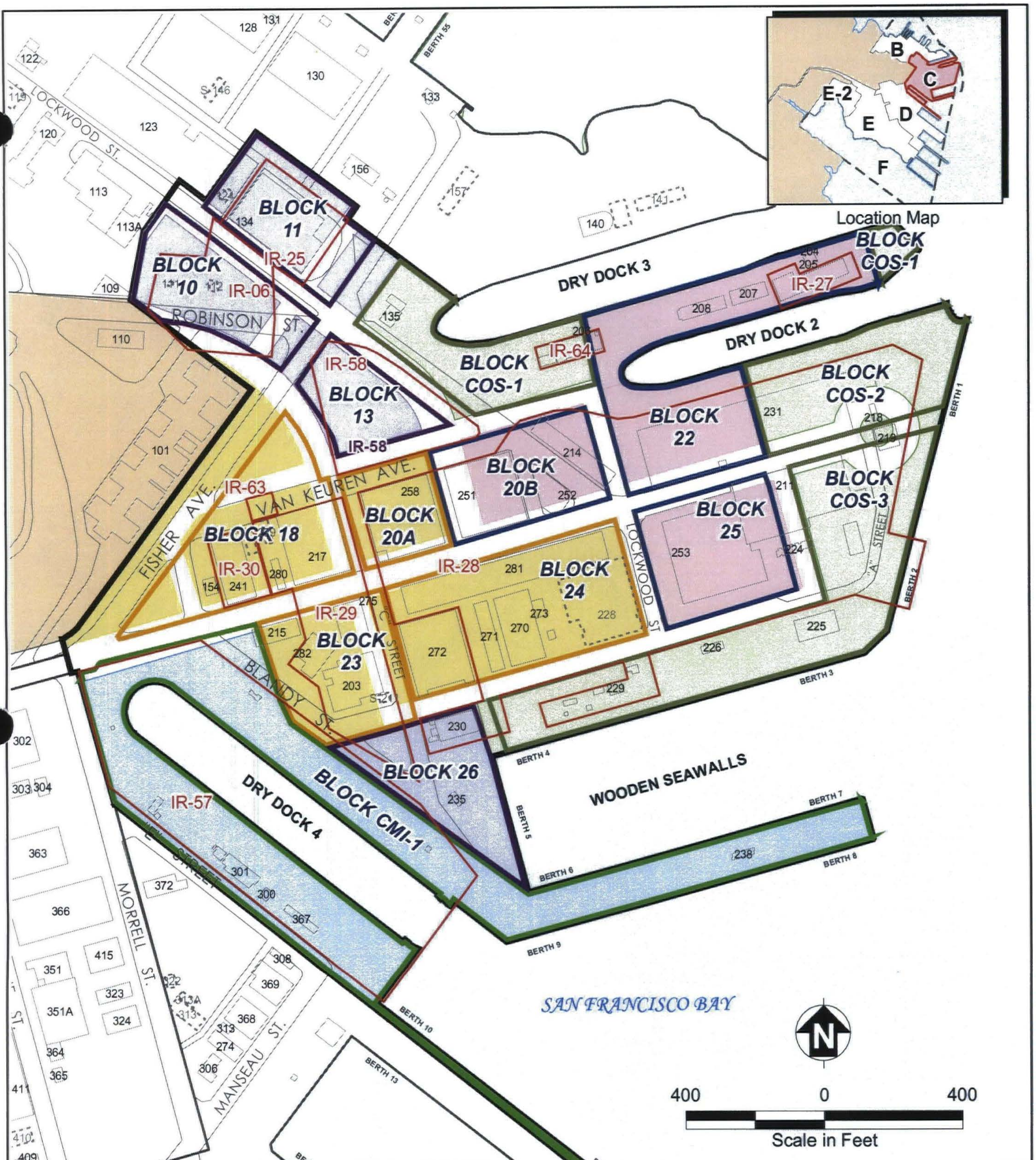
The following exposure routes for chemicals have been identified at HPS:

- Ingestion of metals, VOCs, SVOCs, pesticides, and PCBs in soil
- Dermal contact with metals, VOCs, and PAHs in groundwater or metals, VOCs, SVOCs, pesticides, and PCBs in soil
- Inhalation of VOCs

Potential receptors include human population, who may be residents, workers, or visitors at HPS, and marine organisms in the Bay.

SEC. 2 - FIGURES

FIGURES



Reuse Category	Redevelopment Block
Educational/Cultural	Educational/Cultural
Maritime/Industrial	Maritime/Industrial
Mixed Use	Mixed Use
Open Space	Open Space
Research and Development	Research and Development
Parcel C Boundary	Building
Parcel C IR Sites	Demolished Building
Non-Navy Property	Road

Note:
IR Installation Restoration

SulTech

Hunters Point Shipyard, San Francisco, California
U.S. Department of the Navy, BRAC PMO West, San Diego, California

FIGURE 2-1

PARCEL C REDEVELOPMENT BLOCK, REUSE CATEGORY, AND IR SITES MAP

Feasibility Study Report for Parcel C

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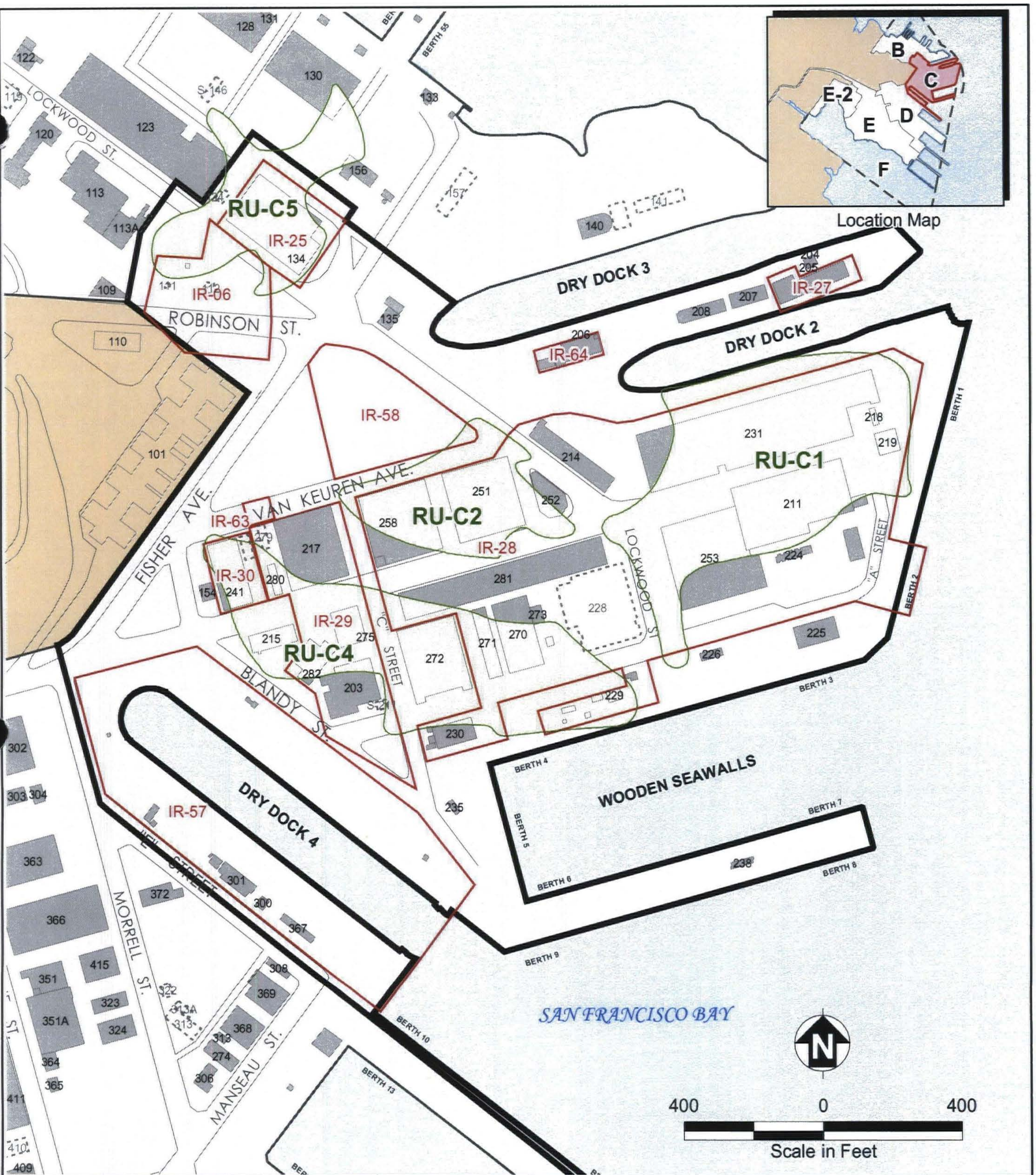

- Parcel C Boundary
- Parcel C IR Sites
- Remedial Unit Boundary
- Non-Navy Property
- Building
- Demolished Building
- Road

Notes:
IR Installation Restoration
RU Remedial Unit

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FIGURE 2-2

PARCEL C IR SITES AND CURRENT GROUNDWATER RUs

Feasibility Study Report for Parcel C

2008-07-08 V:\Hunters_Point\Projects\Parcel_C\FS_2005\Nature and Extent\General_Figures\Parcel C_IR Sites_RUs.mxd TtEMI-SF Kevin Ernst

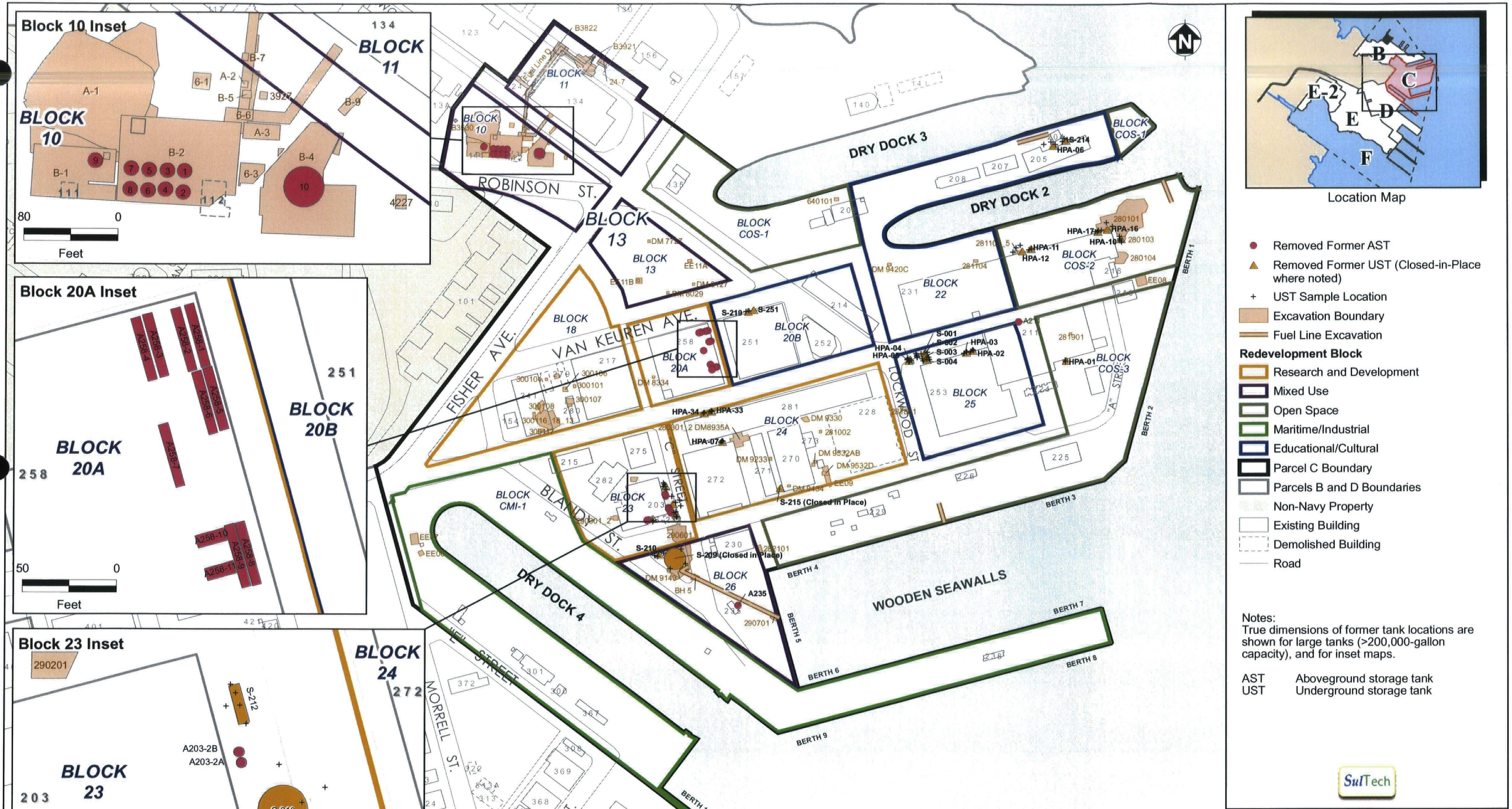

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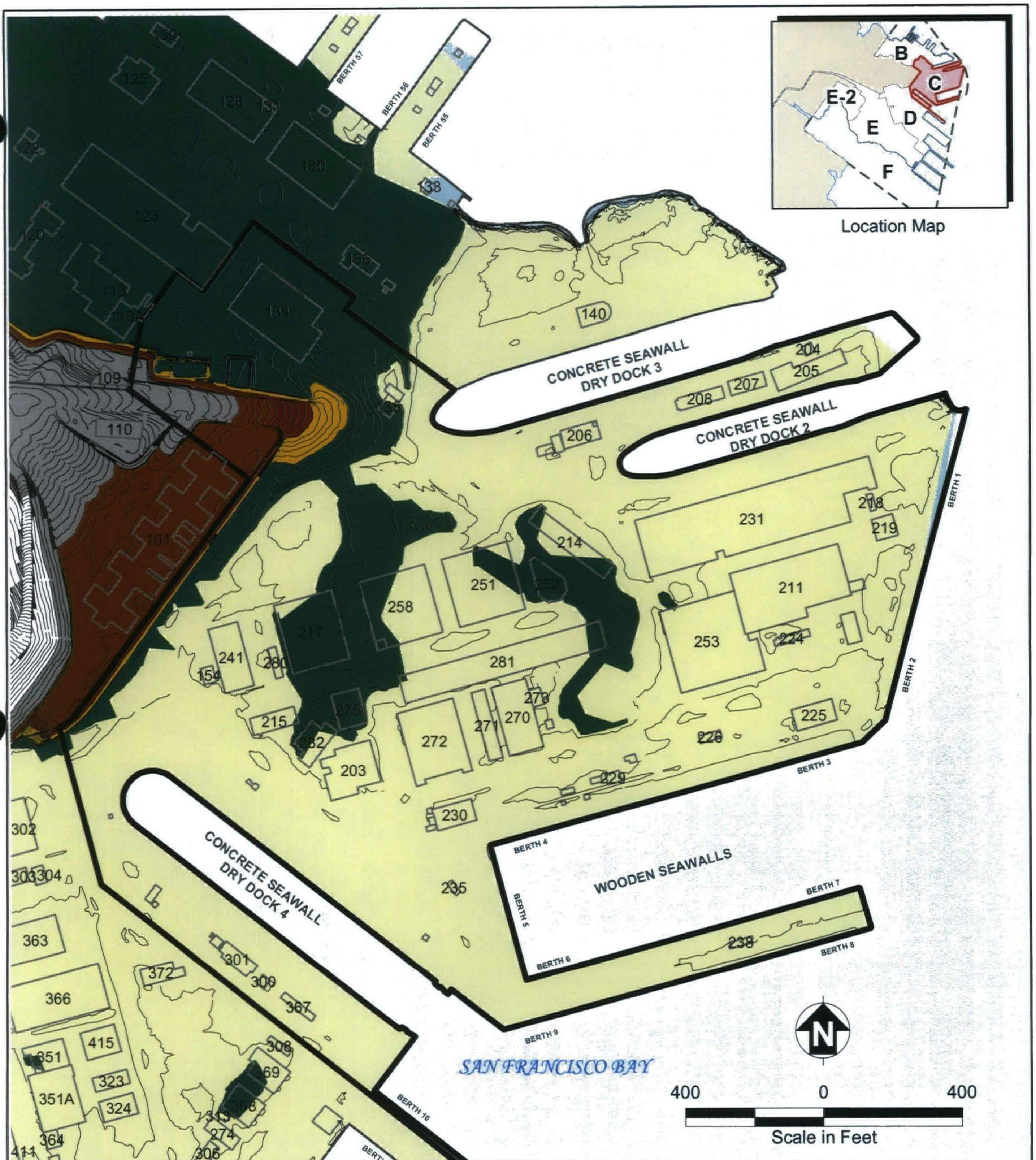
FIGURE 2-3

AST, UST, AND EXCAVATION LOCATIONS AT PARCEL C

Feasibility Study Report for Parcel C

2008-07-08 V:\Hunters_Point\Projects\Parcel_C\FS_2005\Nature and Extent\General_Figures\Parcel C_Excavations_AST_UST_az.mxd TtEMI-SF Kevin Ernst



Elevation Ranges (feet above msl)

- >50
- 30-50
- 25-30
- 20-25
- 15-20
- 10-15
- 5-10
- 0-5

Ground Surface Contour (1-Foot Interval)

Parcel C Boundary

Building

Note:

msl Mean sea level

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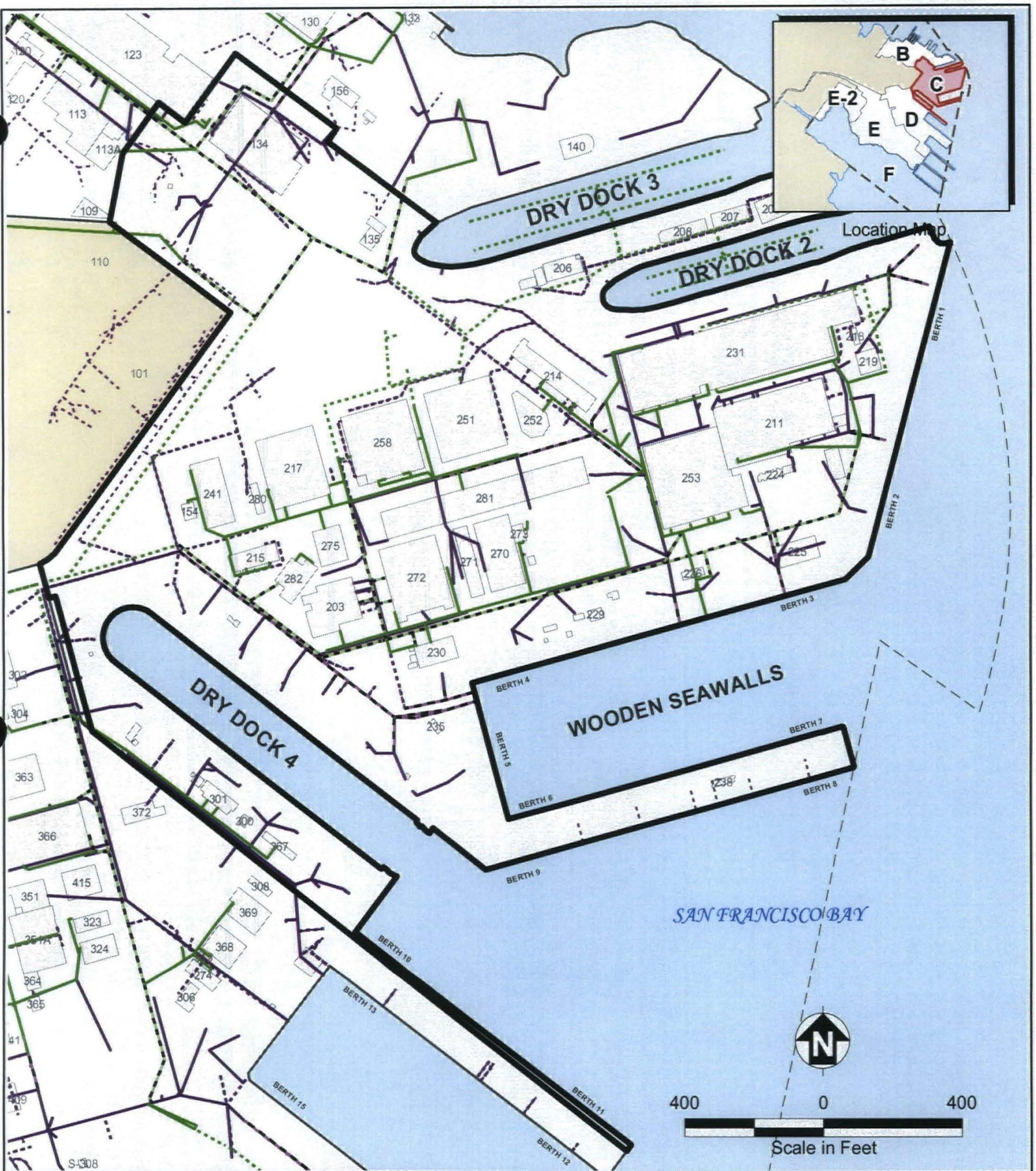
FIGURE 2-4

TOPOGRAPHIC MAP

Feasibility Study Report for Parcel C

2008-07-25 V:\Hunters_Point\Projects\Parcel_C\FS_2005\Nature and Extent\General_Figures\Parcel C Topography.mxd TtEMI-SF Kevin Ernst



Sanitary Sewer Elevation Relative to Groundwater (June 2002)
- Above Groundwater
- Below Groundwater
- Unknown Elevation

Storm Drain Line Relative to Groundwater (June 2002)
- Above Groundwater
- Below Groundwater
- Unknown Elevation

- Parcel C Boundary
- Other Parcel Boundary
- Parcel F Boundary
- Building

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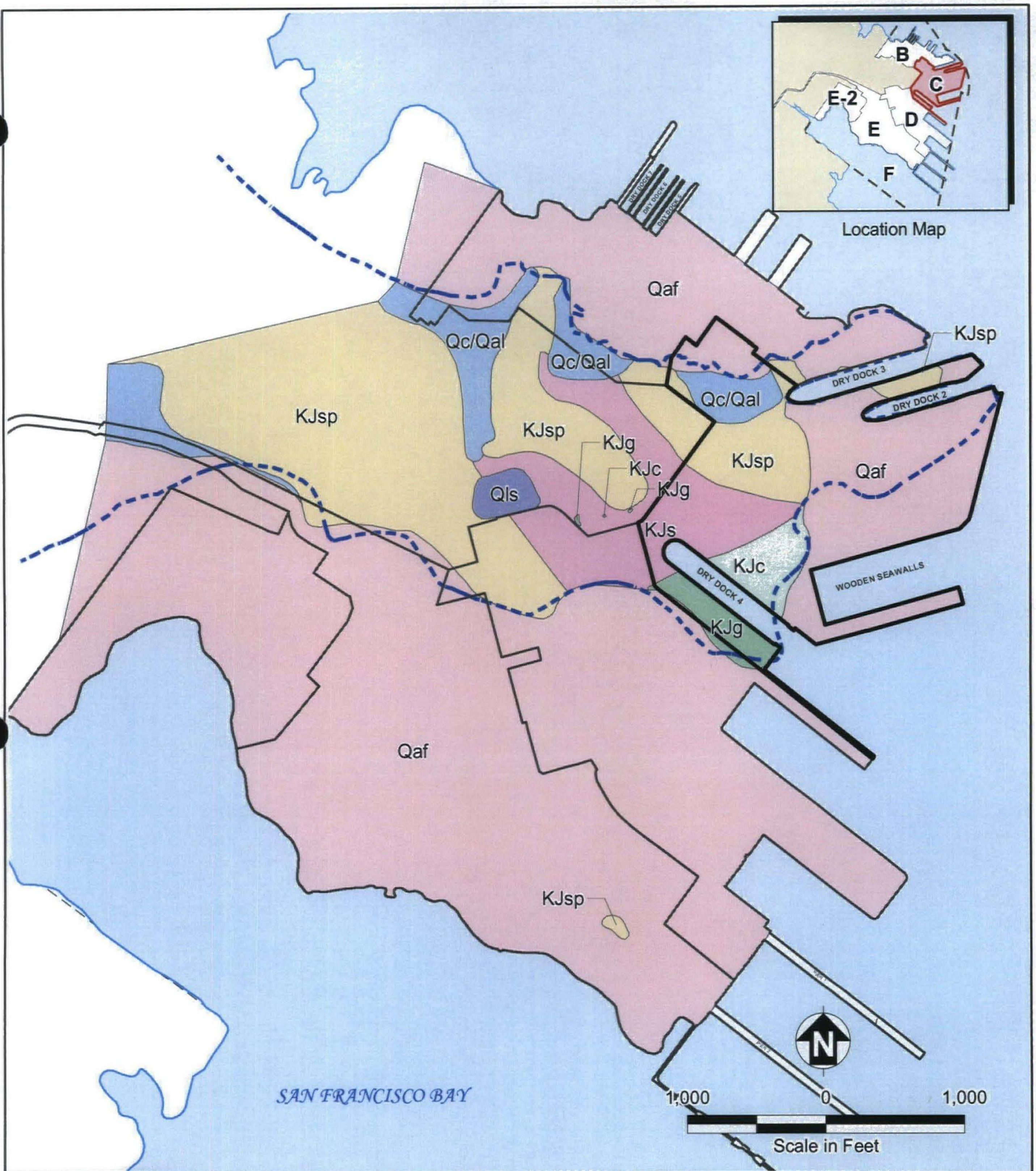
FIGURE 2-5

STORM DRAIN AND SANITARY SEWER LINE MAP

Feasibility Study Report for Parcel C

2008-07-25 V:\Hunters_Point\Projects\Parcel_C\FS_2005\Nature and Extent\General_Figures\Parcel C Storm_Sewer Lines.mxd TtEMI-SF Kevin Ernst



Geologic Characterization

- KJc-Chert Interbedded with Shale
- KJg-Predominantly Greenstone Volcanic Rock (Marin Headlands Terrane)
- KJs-Undifferentiated Sandstone and Shale
- KJsp-Serpentinite
- Qaf-Fill Material
- Qc/Qal-Colluvium/Alluvium
- Qls-Landslide Debris Zone
- 1935 Shoreline
- Parcel C Boundary
- Other Parcel Boundaries
- Parcel F Boundary

Reference:

Bonilla, M.G. 1971. "Preliminary Geologic Map of the San Francisco South Quadrangle and Part of the Hunters Point Quadrangle." <ITA>U.S. Geological Survey Miscellaneous Field Studies Map.</ITA> MG-311. 1:24,000

PRC, LFR, U&A, 1997. "Draft Final Parcel C Remedial Investigation Report, Hunters Point Shipyard, San Francisco, California."

Schlocker, J. 1974. "Geology of the San Francisco North Quadrangle, California." <ITA> U.S. Geological Survey Professional Paper 782. </ITA>Page 109.

Tetra Tech EM Inc. 2001. "Evaluation of Ambient Manganese Conditions, Hunters Point Shipyard, San Francisco, California."

Tetra Tech EM Inc. 2004. "Revised Final Parcel C Groundwater Summary Report, Phase III Groundwater Data Gaps Investigation, Hunters Point Shipyard, San Francisco, California."

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FIGURE 2-6

SURFICIAL GEOLOGY

Feasibility Study Report for Parcel C

PARTIALLY SCANNED OVERSIZE ITEM(S)

See document # 2259669
for partially scanned image(s).
FIGURES 2-7 TO FIGURE 2-15
(1 OF 31 TO 9 OF 31)

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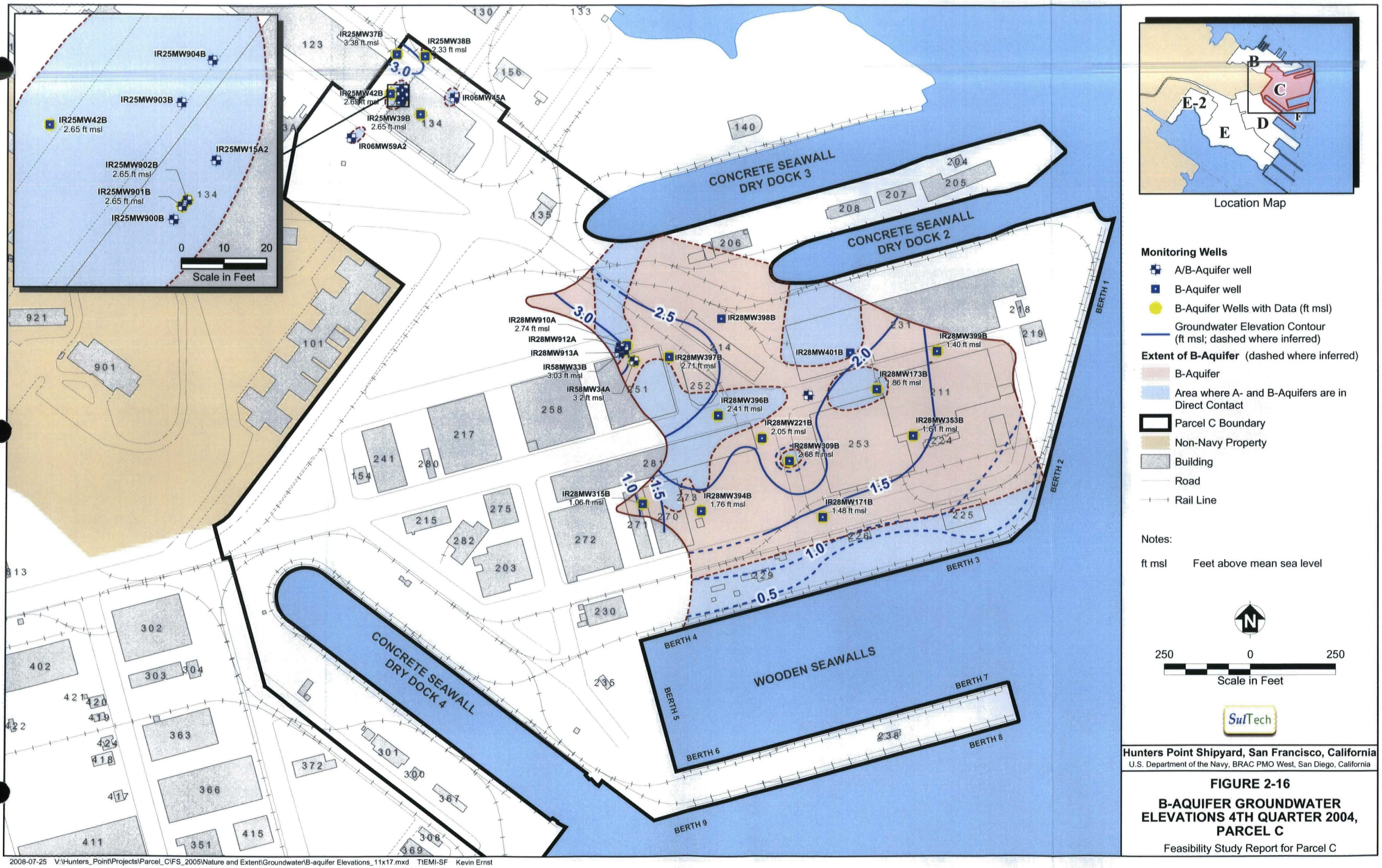

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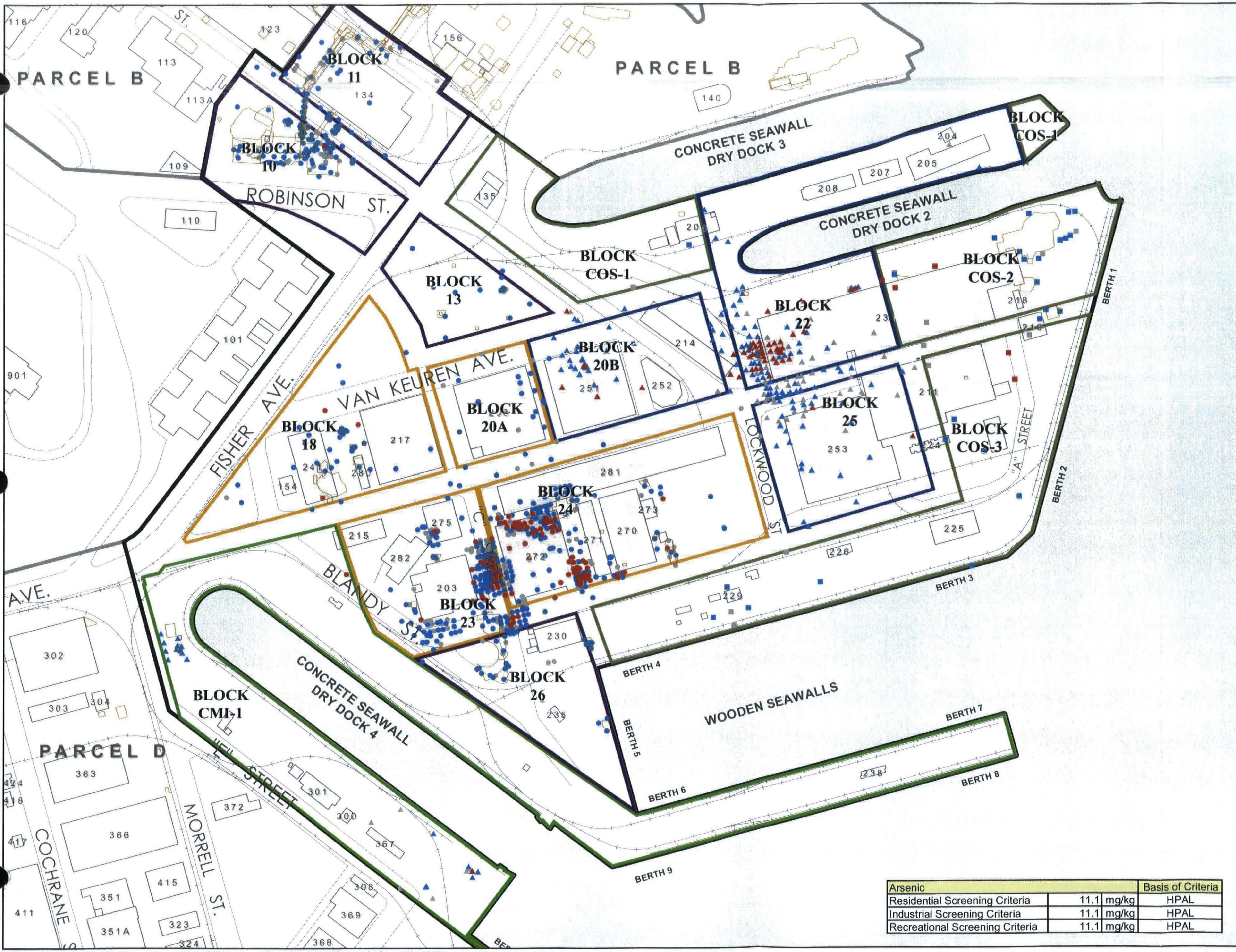
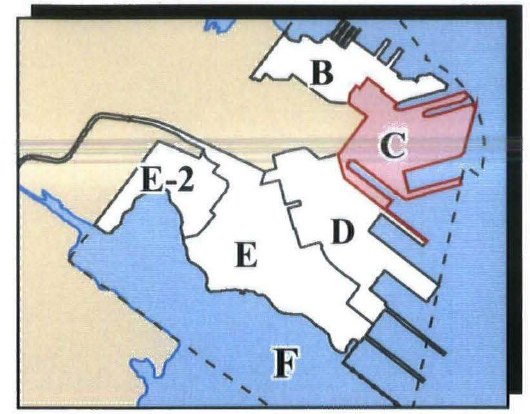
FIGURE 2-16

B-AQUIFER GROUNDWATER ELEVATIONS 4TH QUARTER 2004, PARCEL C

Feasibility Study Report for Parcel C



Arsenic			Basis of Criteria
Residential Screening Criteria	11.1	mg/kg	HPAL
Industrial Screening Criteria	11.1	mg/kg	HPAL
Recreational Screening Criteria	11.1	mg/kg	HPAL



Location Map

Analytical Results vs. Screening Criteria

- Exceed
- Do Not Exceed
- Nondetected
- Excavation Outline
- Parcel C Boundary
- Other Parcel Boundary
- Building
- Rail Line
- Road

Screening Criteria:
- Industrial
- Recreational
- Residential

Redevelopment Block

- Research and Development
- Mixed Use
- Open Space
- Maritime/Industrial
- Educational/Cultural

Notes:
1. Results represented on this figure are from soil samples collected between 0 and 10 feet bgs that were not removed by excavations during subsequent removal actions.
2. For Parcel C open space redevelopment blocks, the human health risk assessment only included results from soil samples collected between 0 and 2 feet bgs.

bgs Below ground surface
HPAL Hunters Point ambient level
mg/kg Milligram per kilogram

N

250 0 250

Scale in Feet

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FIGURE 2-17

DISTRIBUTION OF ARSENIC IN SOIL

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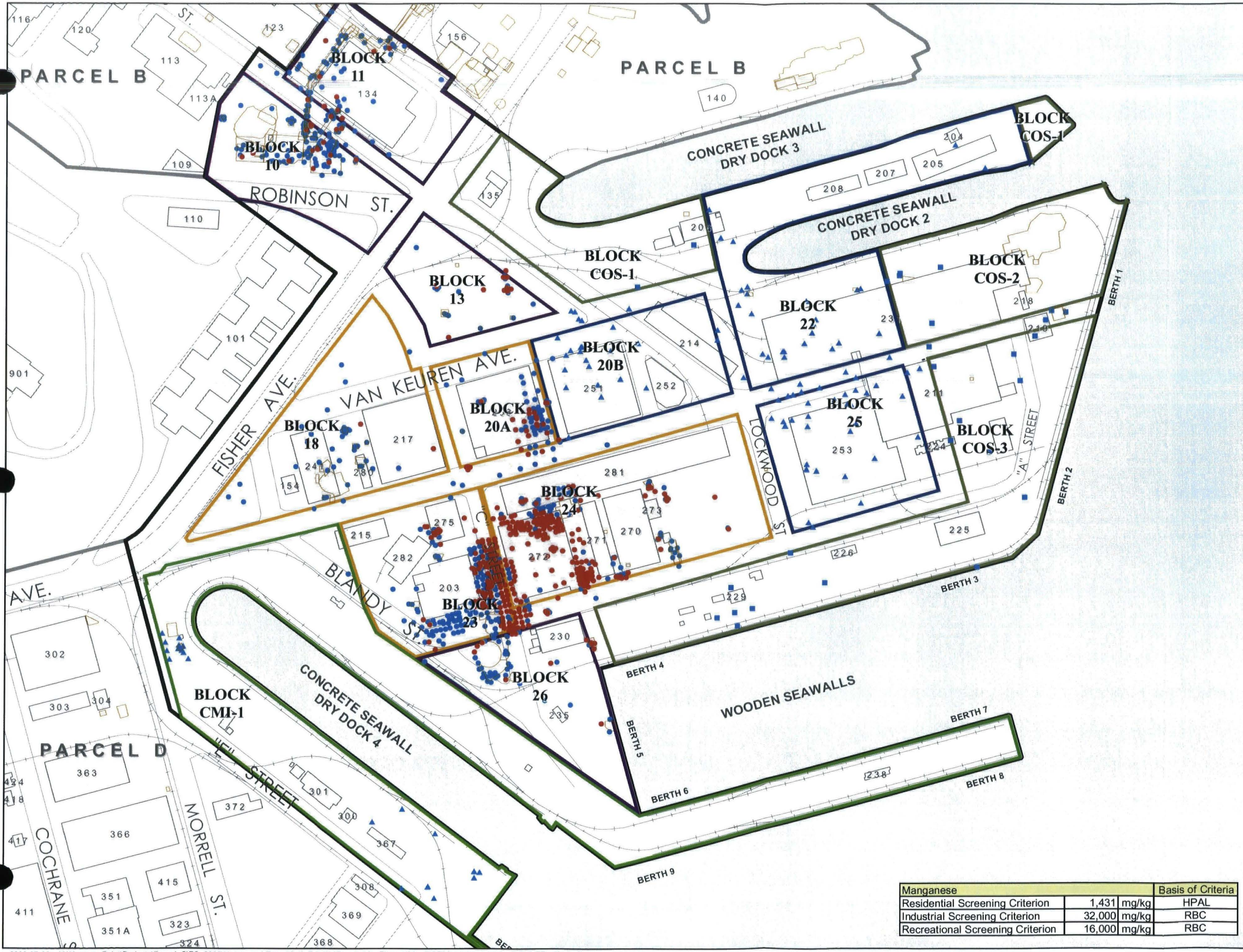

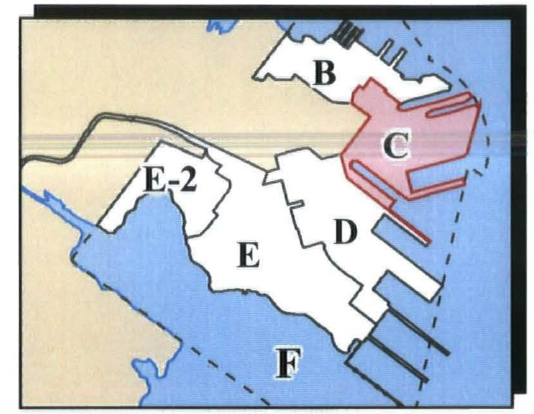

Location Map

Analytical Results vs. Screening Criteria

- Exceed
- Do Not Exceed
- Nondetected
- Excavation Outline
- Parcel C Boundary
- Other Parcel Boundary
- Building
- Rail Line
- Road

Screening Criteria:
- △ Industrial
- □ Recreational
- ○ Residential

Redevelopment Block

- Research and Development
- Mixed Use
- Open Space
- Maritime/Industrial
- Educational/Cultural

Notes:
1. Results represented on this figure are from soil samples collected between 0 and 10 feet bgs that were not removed by excavations during subsequent removal actions.
2. For Parcel C open space redevelopment blocks, the human health risk assessment only included results from soil samples collected between 0 and 2 feet bgs.

bgs	Below ground surface
HPAL	Hunters Point ambient level
mg/kg	Milligram per kilogram
RBC	Risk-based concentration (developed in Appendix C)

N

250 0 250

Scale in Feet

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Manganese			Basis of Criteria
Residential Screening Criterion	1,431	mg/kg	HPAL
Industrial Screening Criterion	32,000	mg/kg	RBC
Recreational Screening Criterion	16,000	mg/kg	RBC

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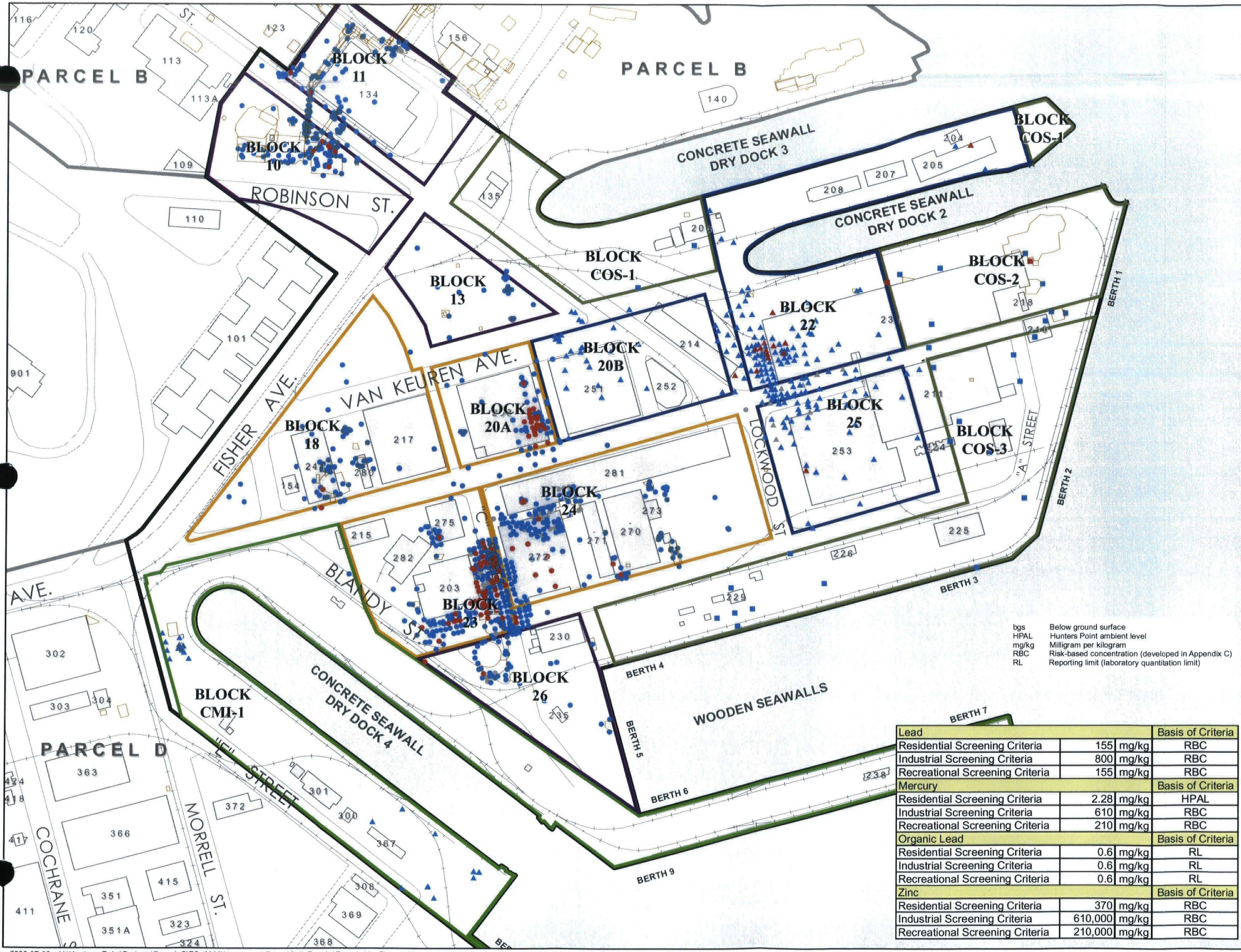
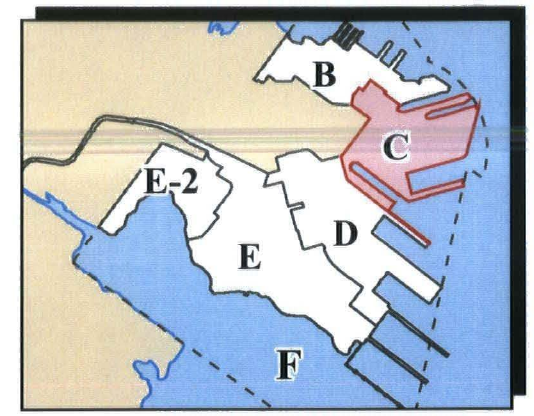
FIGURE 2-18

DISTRIBUTION OF MANGANESE IN SOIL

Feasibility Study Report for Parcel C

2008-07-08 V:\Hunters_Point\Projects\Parcel_C\FS_2005\Nature and Extent\Soil_Results\Parcelwide_Figures\May2007\Manganese.mxd TtEMI-SF Kevin Ernst





Location Map

Analytical Results vs. Screening Criteria

- Exceed
- Do Not Exceed
- Nondetected

Screening Criteria:
- Industrial
- Recreational
- Residential

- Excavation Outline
- Parcel C Boundary
- Other Parcel Boundary
- Building
- Rail Line
- Road

Redevelopment Block

- Research and Development
- Mixed Use
- Open Space
- Maritime/Industrial
- Educational/Cultural

Notes:
1. Results represented on this figure are from soil samples collected between 0 and 10 feet bgs that were not removed by excavations during subsequent removal actions.
2. For Parcel C open space redevelopment blocks, the human health risk assessment only included results from soil samples collected between 0 and 2 feet bgs.
3. The parcel-wide distributions in soil of lead, mercury, organic lead, and zinc are shown together because the remedial alternative(s) evaluated to remediate metals contamination will be applied at areas with nonubiquitous metals contamination, regardless of the individual metal.

bgs Below ground surface
HPAL Hunters Point ambient level
mg/kg Milligram per kilogram
RBC Risk-based concentration (developed in Appendix C)
RL Reporting limit (laboratory quantitation limit)

Lead			Basis of Criteria
Residential Screening Criteria	155	mg/kg	RBC
Industrial Screening Criteria	800	mg/kg	RBC
Recreational Screening Criteria	155	mg/kg	RBC
Mercury			Basis of Criteria
Residential Screening Criteria	2.28	mg/kg	HPAL
Industrial Screening Criteria	610	mg/kg	RBC
Recreational Screening Criteria	210	mg/kg	RBC
Organic Lead			Basis of Criteria
Residential Screening Criteria	0.6	mg/kg	RL
Industrial Screening Criteria	0.6	mg/kg	RL
Recreational Screening Criteria	0.6	mg/kg	RL
Zinc			Basis of Criteria
Residential Screening Criteria	370	mg/kg	RBC
Industrial Screening Criteria	610,000	mg/kg	RBC
Recreational Screening Criteria	210,000	mg/kg	RBC

250 0 250
Scale in Feet

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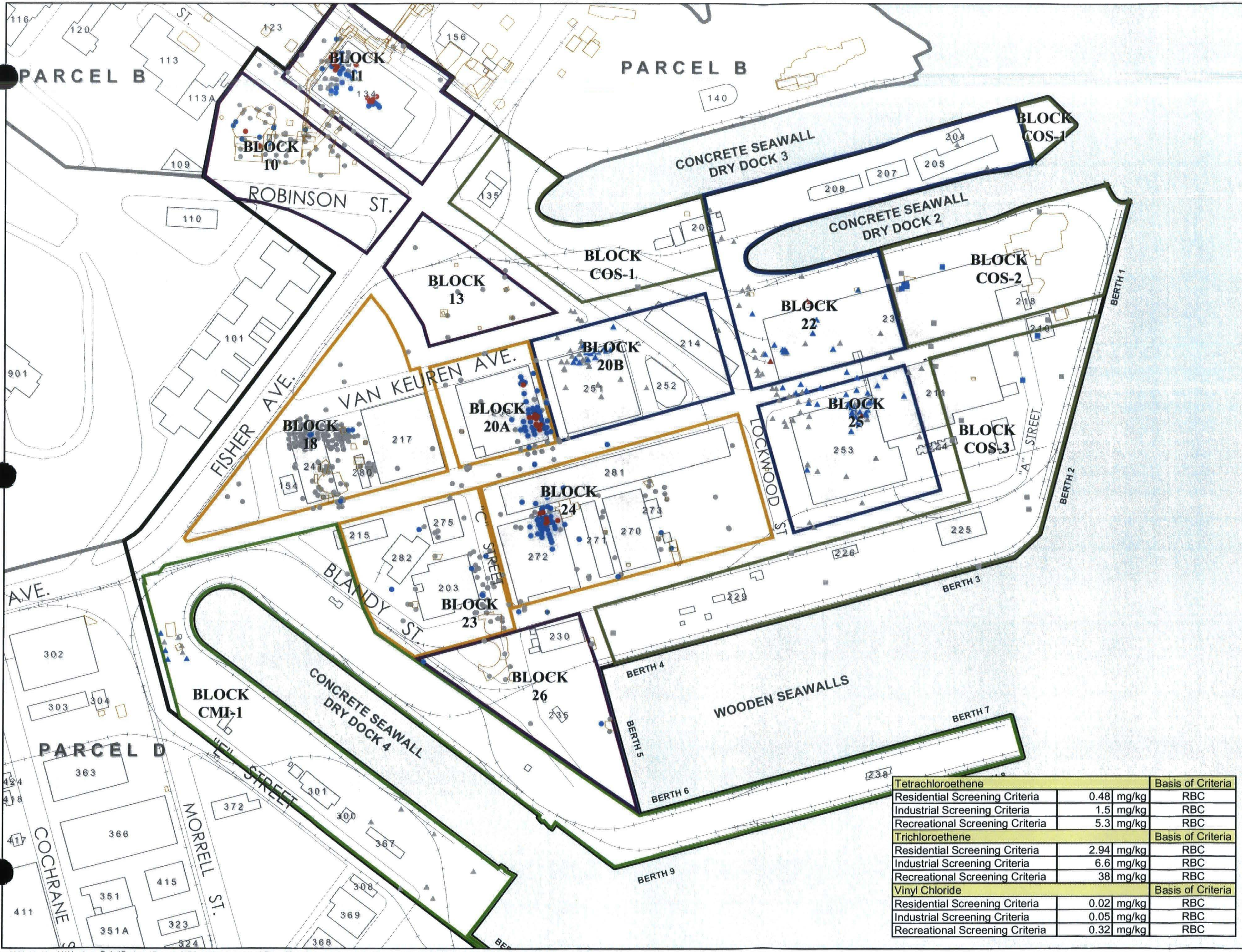
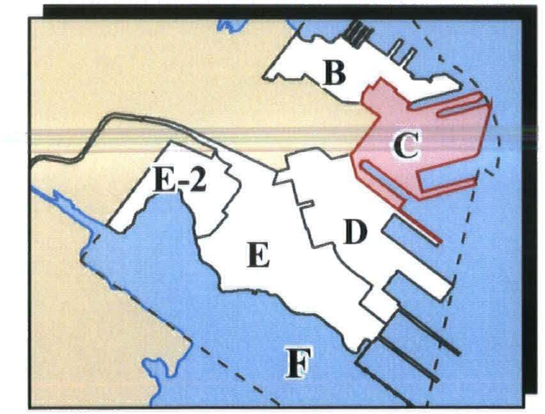
FIGURE 2-19

DISTRIBUTION OF LEAD, MERCURY, ORGANIC LEAD, AND ZINC IN SOIL
Feasibility Study Report for Parcel C

2008-07-08 V:\Hunters_Point\Projects\Parcel_C\FS_2005\Nature and Extent\Soil_Results\Parcelwide_Figures\May2007\Pb_OrgPb_Hg_Zn.mxd TtEMI-SF Kevin Ernst





Location Map

Analytical Results vs. Screening Criteria

- Exceed
- Do Not Exceed
- Nondetected
- Excavation Outline
- Parcel C Boundary
- Other Parcel Boundary
- Building
- Rail Line
- Road

Screening Criteria:
- Industrial
- Recreational
- Residential

Redevelopment Block

- Research and Development
- Mixed Use
- Open Space
- Maritime/Industrial
- Educational/Cultural

Notes:
1. Results represented on this figure are from soil samples collected between 0 and 10 feet bgs that were not removed by excavations during subsequent removal actions.
2. For Parcel C open space redevelopment blocks, the human health risk assessment only included results from soil samples collected between 0 and 2 feet bgs.

bgs Below ground surface
mg/kg Milligram per kilogram
PCE Tetrachloroethene
RBC Risk-based concentration (developed in Appendix C)
TCE Trichloroethene

N

250 0 250
Scale in Feet

Tetrachloroethene			Basis of Criteria
Residential Screening Criteria	0.48	mg/kg	RBC
Industrial Screening Criteria	1.5	mg/kg	RBC
Recreational Screening Criteria	5.3	mg/kg	RBC
Trichloroethene			**Basis of Criteria**
Residential Screening Criteria	2.94	mg/kg	RBC
Industrial Screening Criteria	6.6	mg/kg	RBC
Recreational Screening Criteria	38	mg/kg	RBC
Vinyl Chloride			**Basis of Criteria**
Residential Screening Criteria	0.02	mg/kg	RBC
Industrial Screening Criteria	0.05	mg/kg	RBC
Recreational Screening Criteria	0.32	mg/kg	RBC

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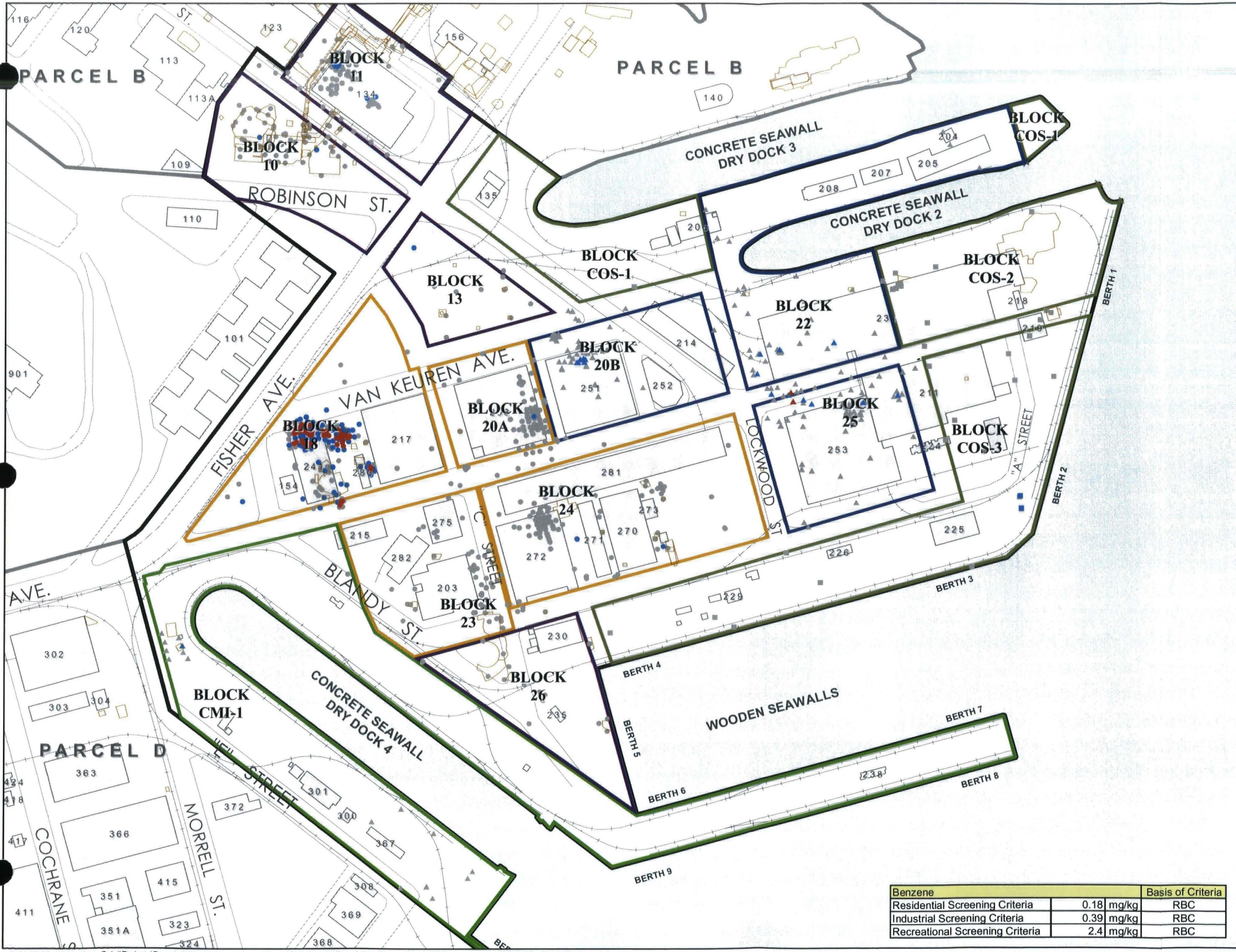
FIGURE 2-20

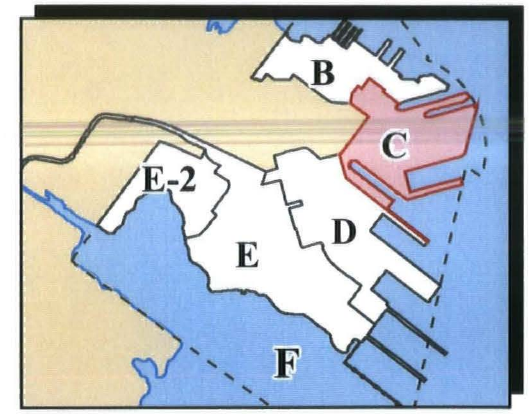
DISTRIBUTION OF PCE, TCE, AND VINYL CHLORIDE IN SOIL

Feasibility Study Report for Parcel C

2008-07-08 V:\Hunters_Point\Projects\Parcel_C\FS_2005\Nature and Extent\Soil_Results\Parcelwide_Figures\May2007\PCE_TCE_VC.mxd TtEMI-SF Kevin Ernst



Benzene			Basis of Criteria
Residential Screening Criteria	0.18	mg/kg	RBC
Industrial Screening Criteria	0.39	mg/kg	RBC
Recreational Screening Criteria	2.4	mg/kg	RBC



Location Map

Analytical Results vs. Screening Criteria

- Exceed
- Do Not Exceed
- Nondetected
- Excavation Outline
- Parcel C Boundary
- Other Parcel Boundary
- Building
- Rail Line
- Road

Screening Criteria:
- △ Industrial
- □ Recreational
- ○ Residential

Redevelopment Block

- Research and Development
- Mixed Use
- Open Space
- Maritime/Industrial
- Educational/Cultural

Notes:
1. Results represented on this figure are from soil samples collected between 0 and 10 feet bgs that were not removed by excavations during subsequent removal actions.
2. For Parcel C open space redevelopment blocks, the human health risk assessment only included results from soil samples collected between 0 and 2 feet bgs.

bgs	Below ground surface
mg/kg	Milligram per kilogram
RBC	Risk-based concentration (developed in Appendix C)

250 0 250
Scale in Feet

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FIGURE 2-21

DISTRIBUTION OF BENZENE IN SOIL

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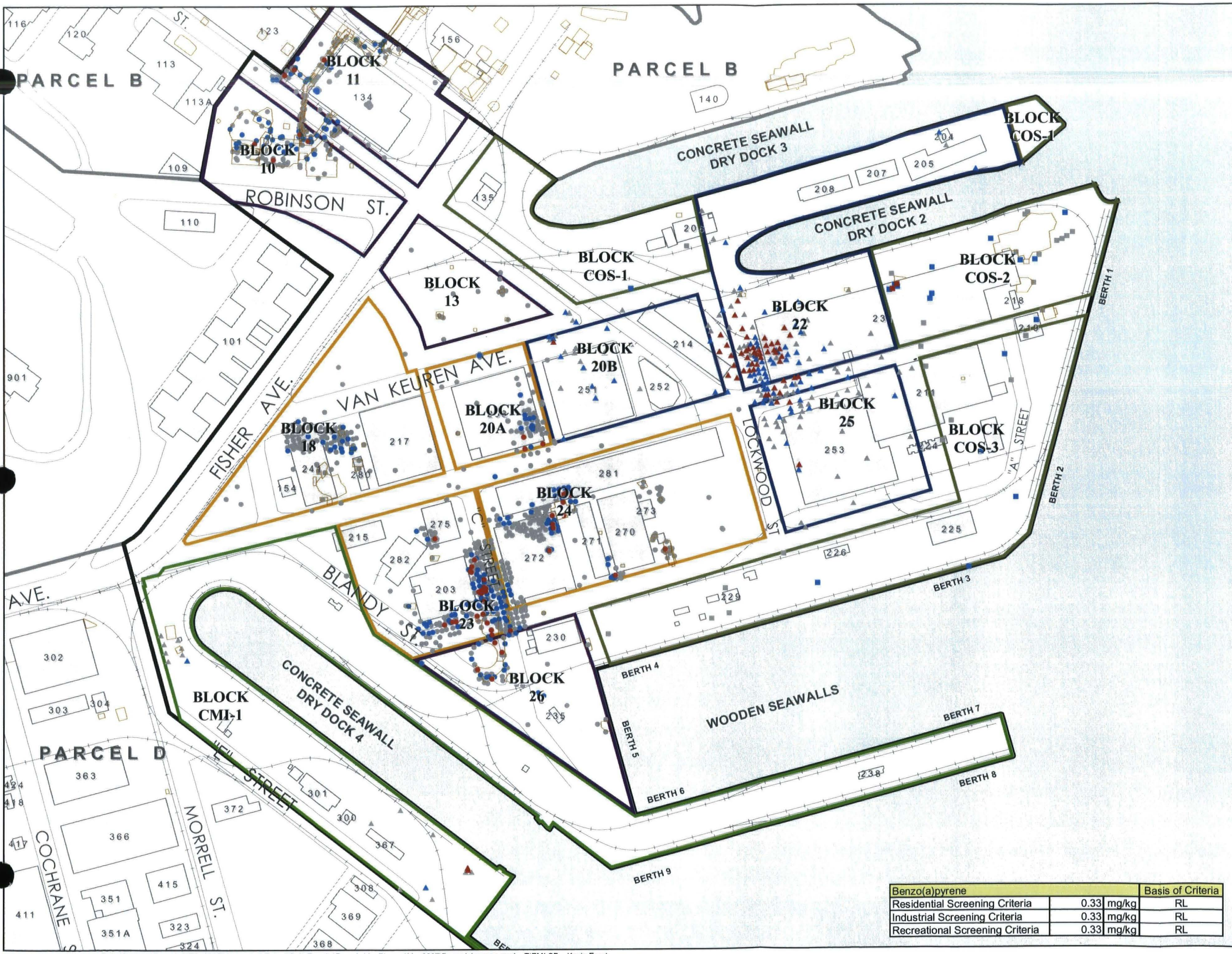
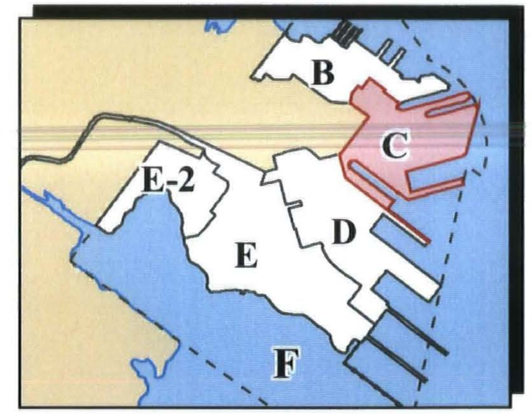
2008-07-08 V:\Hunters_Point\Projects\Parcel_C\FS_2005\Nature and Extent\Soil_Results\Parcelwide_Figures\May2007\Benzene.mxd TtEMI-SF Kevin Ernst





Location Map

Analytical Results vs. Screening Criteria

- Exceed
- Do Not Exceed
- Nondetected
- Excavation Outline
- Parcel C Boundary
- Other Parcel Boundary
- Building
- Rail Line
- Road

Screening Criteria:
- Industrial
- Recreational
- Residential

Redevelopment Block

- Research and Development
- Mixed Use
- Open Space
- Maritime/Industrial
- Educational/Cultural

Notes:
1. Results represented on this figure are from soil samples collected between 0 and 10 feet bgs that were not removed by excavations during subsequent removal actions.
2. For Parcel C open space redevelopment blocks, the human health risk assessment only included results from soil samples collected between 0 and 2 feet bgs.

bgs Below ground surface
mg/kg Milligram per kilogram
RL Reporting limit (laboratory quantitation limit)

250 0 250
Scale in Feet

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FIGURE 2-22

DISTRIBUTION OF BENZO(A)PYRENE IN SOIL

Feasibility Study Report for Parcel C

Benzo(a)pyrene			Basis of Criteria
Residential Screening Criteria	0.33	mg/kg	RL
Industrial Screening Criteria	0.33	mg/kg	RL
Recreational Screening Criteria	0.33	mg/kg	RL

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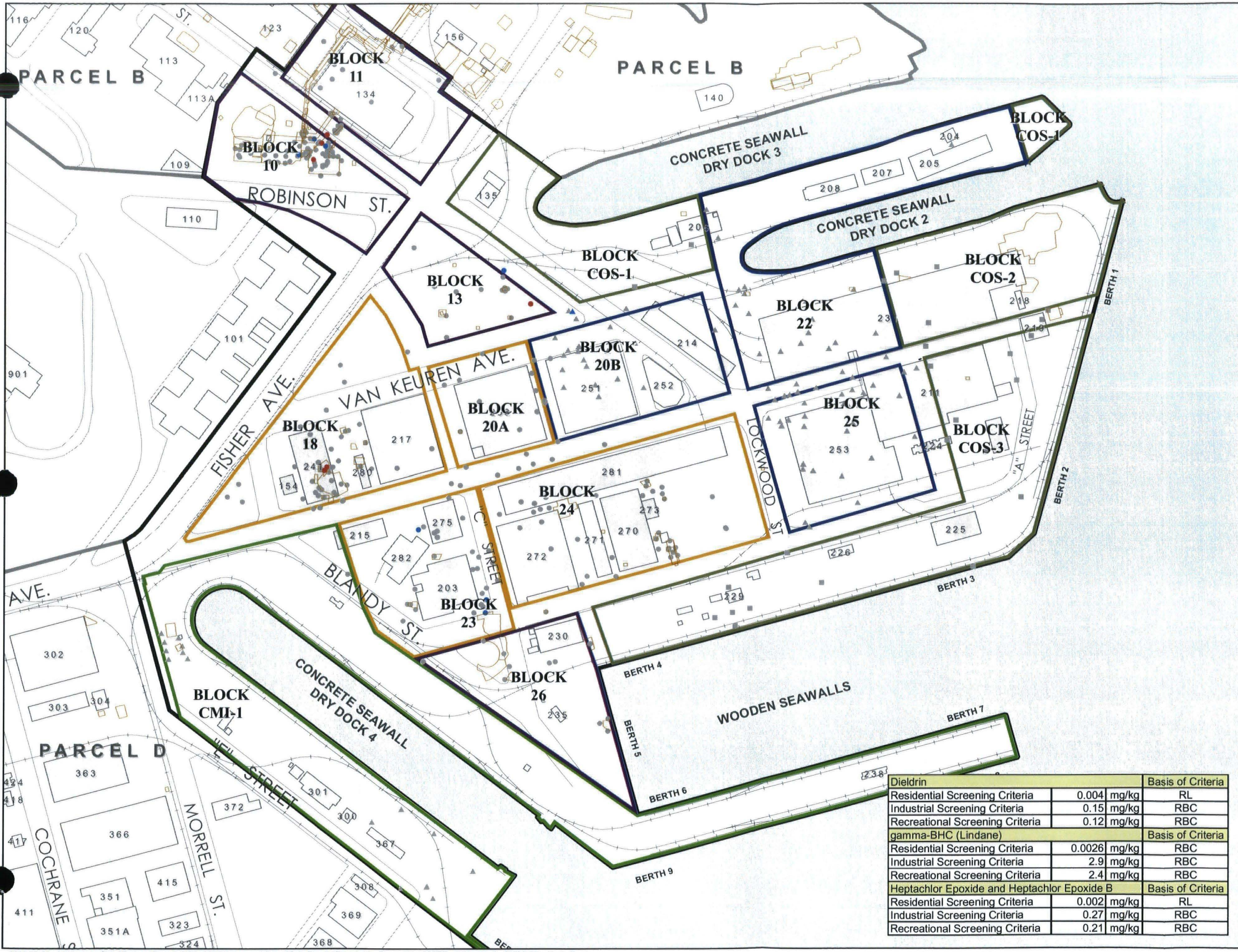
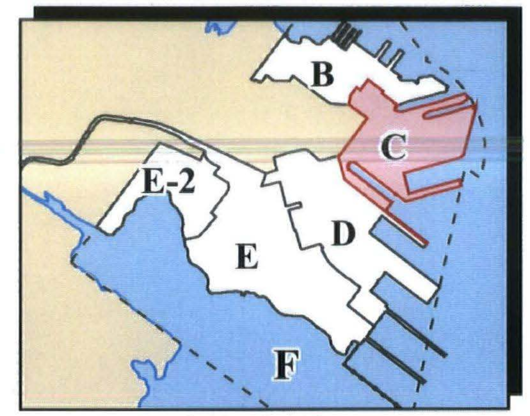


Dieldrin			Basis of Criteria
Residential Screening Criteria	0.004	mg/kg	RL
Industrial Screening Criteria	0.15	mg/kg	RBC
Recreational Screening Criteria	0.12	mg/kg	RBC
gamma-BHC (Lindane)			Basis of Criteria
Residential Screening Criteria	0.0026	mg/kg	RBC
Industrial Screening Criteria	2.9	mg/kg	RBC
Recreational Screening Criteria	2.4	mg/kg	RBC
Heptachlor Epoxide and Heptachlor Epoxide B			Basis of Criteria
Residential Screening Criteria	0.002	mg/kg	RL
Industrial Screening Criteria	0.27	mg/kg	RBC
Recreational Screening Criteria	0.21	mg/kg	RBC



Location Map

Analytical Results vs. Screening Criteria

- Exceed
- Do Not Exceed
- Nondetected
- Excavation Outline
- Parcel C Boundary
- Other Parcel Boundary
- Building
- Rail Line
- Road

Screening Criteria:
- Industrial
- Recreational
- Residential

Redevelopment Block

- Research and Development
- Mixed Use
- Open Space
- Maritime/Industrial
- Educational/Cultural

Notes:
1. Results represented on this figure are from soil samples collected between 0 and 10 feet bgs that were not removed by excavations during subsequent removal actions.
2. For Parcel C open space redevelopment blocks, the human health risk assessment only included results from soil samples collected between 0 and 2 feet bgs.

bgs Below ground surface
BHC Benzene hexachloride
mg/kg Milligram per kilogram
RBC Risk-based concentration (developed in Appendix C)
RL Reporting limit (laboratory quantitation limit)

250 0 250
Scale in Feet

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FIGURE 2-23

DISTRIBUTION OF PESTICIDES IN SOIL

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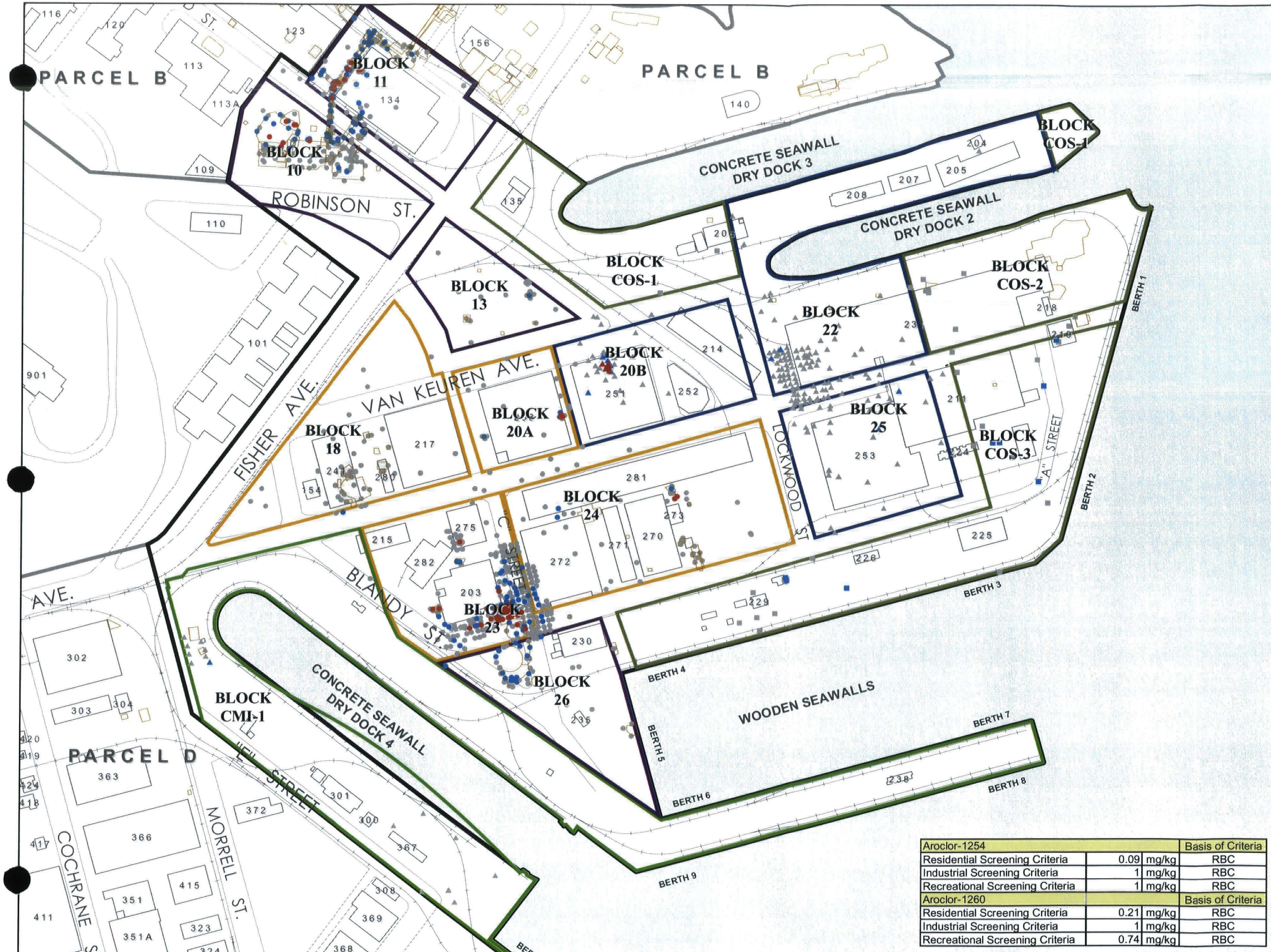

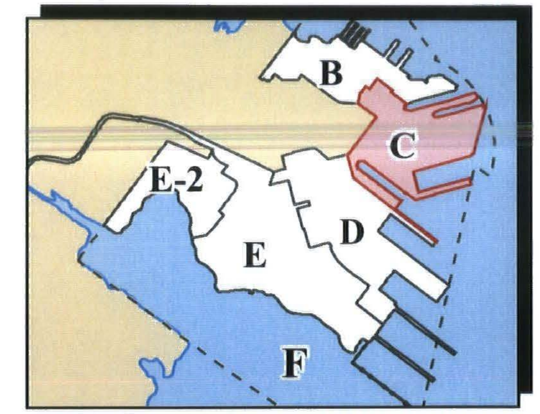

Location Map

Analytical Results vs. Screening Criteria

- Exceed
- Do Not Exceed
- Nondetected
- Excavation Outline
- Parcel C Boundary
- Other Parcel Boundary
- Building
- Rail Line
- Road

Screening Criteria:
- Industrial
- Recreational
- Residential

Redevelopment Block

- Research and Development
- Mixed Use
- Open Space
- Maritime/Industrial
- Educational/Cultural

Notes:
1. Results represented on this figure are from soil samples collected between 0 and 10 feet bgs that were not removed by excavations during subsequent removal actions.
2. For Parcel C open space redevelopment blocks, the human health risk assessment only included results from soil samples collected between 0 and 2 feet bgs.

bgs	Below ground surface
mg/kg	Milligram per kilogram
PCB	Polychlorinated biphenyl
RBC	Risk-based concentration (developed in Appendix C)

250 0 250
Scale in Feet

Aroclor-1254			Basis of Criteria
Residential Screening Criteria	0.09	mg/kg	RBC
Industrial Screening Criteria	1	mg/kg	RBC
Recreational Screening Criteria	1	mg/kg	RBC
Aroclor-1260			**Basis of Criteria**
Residential Screening Criteria	0.21	mg/kg	RBC
Industrial Screening Criteria	1	mg/kg	RBC
Recreational Screening Criteria	0.74	mg/kg	RBC

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FIGURE 2-24

DISTRIBUTION OF PCBs IN SOIL

Feasibility Study Report for Parcel C

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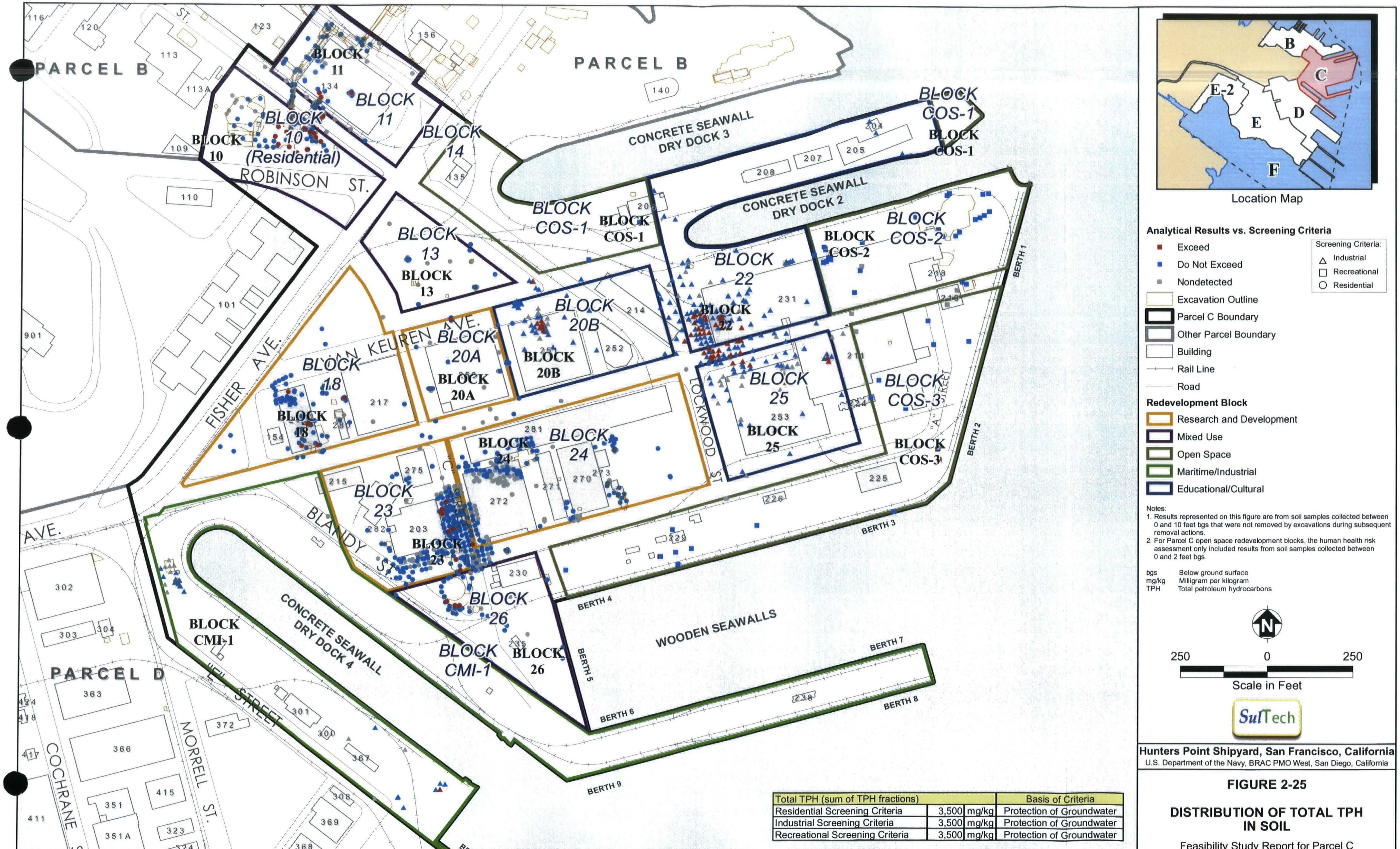

Total TPH (sum of TPH fractions)			Basis of Criteria
Residential Screening Criteria	3,500	mg/kg	Protection of Groundwater
Industrial Screening Criteria	3,500	mg/kg	Protection of Groundwater
Recreational Screening Criteria	3,500	mg/kg	Protection of Groundwater

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FIGURE 2-25

DISTRIBUTION OF TOTAL TPH IN SOIL

Feasibility Study Report for Parcel C

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PARTIALLY SCANNED OVERSIZE ITEM(S)

See document # 2259669
for partially scanned image(s).
FIGURES 2-26 TO FIGURE 2-47
(10 OF 31 TO 31 OF 31)

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SEC. 2 - TABLES

TABLES

TABLE 2-1: IR SITES AND REDEVELOPMENT BLOCKS
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

IR Site	IR Site Significant Features	Corresponding Redevelopment Block	Notes
IR-06	Former Buildings 111 and 112 and Tank Farm	RB-10	The site is currently vacant land
IR-25	Building 134	RB-11	Building 134 contains a former degreaser pit and former separator
IR-27	Building 205	RB-22	RB-22 also includes Buildings 231, 204, 208, 207, and two former USTs, HPA-06 and S-214
IR-28 NE	Buildings 231 and 218 and five former USTs	COS-2	The former USTs are HPA-10, HPA-11, HPA-12, HPA-16, and HPA-17
IR-28 N	Buildings 251, 252, and 214 and two former USTs	RB-20B	Building 251 contains a sump and dip tank area. The former USTs are S-251 and S-219
IR-28 NW	Building 258	RB-20A	Building 258 contains a pickling and degreasing area
IR-28 SW	Buildings 281, 271, and 270; former Building 273 and 228; and four former USTs	RB-24	RB-24 also includes Building 272 Building 281 contains two sump and dip areas. The former USTS are S-215, HPA-07, HPA-33, and HPA-34,
IR-28 SE	Buildings 253, 211, and 224 and nine former USTs	RB-25, COS-1	The former USTS in RB-25 are HPA-02, HPA-03, HPA-04, HPA-05, S-001, S-002, S-003 and S-004. Former UST HPA-01, IR-28SE is in RB-COS-3
IR-28 S	Building 229	COS-3	COS-3 also includes Buildings 219, 226, and 225
IR-28 S	Building 230	RB-26	RB-26 also includes Building 235 and USTs S-209 and S-210
IR-29 N	Buildings 217, 279, and 280	RB-18	RB-18 also includes Buildings 154 and 241
IR-29 S	Buildings 275, 282, 203, and 211	RB-23	RB-23 includes Building 215 and former UST S-203, but excludes former USTs S-211, S-212, and S-213
IR-30	Building 241	RB-18	RB-18 also includes Building 154
IR-45	Steam Line System	No RB	Parcel-wide IR site
IR-49	Fuel Distribution System	No RB	Parcel-wide IR site
IR-50	Storm Drain System	No RB	Parcel-wide IR site
IR-50	Sanitary Sewer System	No RB	Parcel-wide IR site

TABLE 2-1: IR SITES AND REDEVELOPMENT BLOCKS (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

IR Site	IR Site Significant Features	Corresponding Redevelopment Block	Notes
IR-51	Former Transformer Sites	No RB	Parcel-wide IR site
IR-57	Dry Dock 4 and Buildings 300, 301, and 367	CMI-1	
IR-58	Scrap Yard	RB-13	
IR-63	Former Building 278	RB-18	RB-18 also includes Building 154
IR-64	Building 206	COS-1 / RB-22	

Notes:

CMI Parcel C Marine/Industrial
COS Parcel C Open Space
IR Installation Restoration
N North
NE Northeast
NW Northwest
RB Redevelopment block
S South
SE Southeast
SW Southwest
UST Underground storage tank

TABLE 2-2: HISTORICAL USES OF BUILDINGS
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Building Number [a]	Area (ft^2)	Redevelopment Block	Former Shipyard Use (1940 to 1974) [b]	Post- Navy Use [c]	Radiological Contamination Potential [d]
134	51,716	RB-11	Machine Shop, Offices, Central Tool Room	Marine Refrigeration	No
154	1,682	RB-18	Service Building	Service Building	No
203	17,171	RB-23	Power Plant and Boiler Room	Power Plant	Impacted contamination unlikely
204	624	RB-22	Saltwater pumphouse	None	No
205	10,284	RB-22	Dry Dock 2 Pump and Compressor Plant	None	Impacted contamination unlikely
206	5,668	RB-22	Electrical Substation	None	No
207	4,253	RB-22	Restroom	Restroom	No
208	5,048	RB-22	Canteen and service shop	None	No
211	63,263	RB-25/COS-2	Machine and Electronic Test and Repair Shop	Maritime Administration Ship Equipment Storage	Impacted contamination likely
214	26,648	RB-20B	Combat Weapons System Office	Offices	Impacted contamination unlikely
217	35,000	RB-18	Sheet Metal Production, Photoengraving,	Warehouse and Storage	
218	705	COS-2	Restrooms	Restroom	No
219	3,721	COS-3	Electrical Substation	Electrical Substation	No
219	3,721	COS-3	Electrical Substation E	Unoccupied	No
224	2,040	RB-25/COS-3	Bomb Shelter	None	Impacted contamination unlikely
225	6,188	COS-3	Shop Service Building, Work Control Center 2, and Administration Building	None	No
226	1,209	COS-3	Restrooms	Restroom	No
228	34,386	RB-24	Former cafeteria	Restroom	No
229	630	COS-3	Electrical Substation	Electrical Substation	No
230	7,369	RB-26	Machine Shop	Polyurethane Manufacturer	No
231	191,497	RB-22/COS-2	Machine Shop	None	No
236	450		Saltwater Pump House	Saltwater Pump House	No
241	16,246	RB-18	Forge Shop	Metals Heat Treating Facility	No
251	56,163	RB-20B	Industrial Relations & Control Room	None	No
252	8,274	RB-20B	Golden Anchor Coffee Shop	None	No
253	195,347	RB-25	Electronics, Optical, Radio, and Ordnance Shops	None	Impacted - Known (Restricted Access)
258	72,834	RB-20A	Pipe Manufacturer and Fitters Shop	None	No

TABLE 2-2: HISTORICAL USES OF BUILDINGS (CONTINUED)

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Building Number [a]	Area (ft^2)	Redevelopment Block	Former Shipyard Use (1940 to 1974) [b]	Post- Navy Use [c]	Radiological Contamination Potential [d]
270	23,637	RB-24	Paint Shop	Equipment Storage and Office Space	No
271	8,013	RB-24	Paint Shop Annex	Equipment Storage, Barge Services Office	Impacted contamination likely
272	42,923	RB-24	Riggers and Laborers Shop, Shop Service Group	Machine Shop	Impacted contamination unlikely
273	544	RB-24	Electrical Substation	Electrical Substation	No
275	8,500	RB-29	Sheet Metal Fabrication Facility	Aluminum Casting Shop	No
278	3,600	RB-18	Paint Storage	Vacant Lot	No
280	1,983	RB-18	Aluminum Cleaning and Oil Recycling Facility	None	No
281	45,000	RB-24	Electronics-Weapons-Precision Facility	Occasionally leased to	No
300	825	CMI-1	Repair Shop	Dry dock operations support	No
301	4,809	CMI-1	Repair Shop	Dry dock operations support	No
367	2,321	CMI-1	Repair Shop	Dry dock operations support	No

Notes:

a Buildings on this list were identified in the EFA WEST database of HPS Buildings or in the RI Report.

b HPS was deactivated as a Navy facility in 1974.

c Tenant use identified in October 1994 (EFA WEST database of HPS Buildings). Currently, buildings in Parcel C are all unoccupied.

d Radiologically affected areas are defined in the Historical Radiological Assessment (Navy 2004b) as:

An area that has or historically had a potential for general radioactive materials contamination based on the site operating history or known contamination detected during previous radiation surveys. Impacted sites include sites where radioactive materials were used or stored; sites where known spills, discharges, or other instances involving radioactive materials have occurred; or sites where radioactive materials might have been disposed of or buried.

CMI Parcel C Maritime/Industrial

COS Parcel C Open Space

EFA WEST U.S. Department of the Navy, Naval Facilities Engineering Command, Engineering Field Activity West

ft^2 Square feet

HPS Hunters Point Shipyard

RB Redevelopment block

<u>References:</u>

EFA WEST. 1994. Database of HPA Buildings. October 24.

Navy. 2004b. "Historical Radiological Assessment, Volume II, Use of General Radioactive Materials, 1939-2003, Hunters Point Shipyard, San Francisco, California." August 31.

PRC, Levine-Fricke-Recon, Inc., and Uribe & Associates. 1997. "Draft Final Parcel C Remedial Investigation Report, Hunters Point Shipyard, San Francisco, California." March 13.

TABLE 2-3: HISTORY OF INVESTIGATIONS AT PARCEL C
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Activity Duration Dates	Report Date	Investigation Report Title	Company	Parcel C or Facility-Wide	Objective	Activity	Conclusions
February 13-17, 1984	October 1, 1984	Initial Assessment Study	WESTEC Services for NEESA	Facility-Wide	Identify disposal sites and contaminated areas caused by past storage, handling, or disposal practices for hazardous substance from Navy activities.	Perform records search, on-site survey (including ground survey and interviews), confirmation study ranking system, site ranking, and confirmation study (including sampling and analytical testing).	Twelve disposal sites identified; 6 of these sites pose a threat to human health or environment.
June 9, 1986	January 21, 1987	Investigation of PCBs in Soil and Groundwater	ERM-West	Facility-Wide	Determine if PCB concentrations are present in soil, groundwater, surface water, and sediment above action levels.	Install monitoring wells, and collect soil, groundwater, surface water, and sediment samples.	PCBs were detected in some soil samples at concentrations exceeding action levels and required remediation.
June 10, 1988	July 2, 1988	Fence-to-Fence Hazardous Waste Material Survey	ERM-West	Facility-Wide	Identify, locate, and quantify suspected and known hazardous waste and materials.	Inventory and survey buildings at Navy and tenant facilities, and conduct interviews with tenants.	Produce an inventory of hazardous waste and materials at Navy and tenant facilities.
1990-1992	September 1, 1990	Federal Facility Agreement for Treasure Island and HPS	EPA	Facility-Wide	Ensure contamination is thoroughly investigated and remediated to protect human health and environment; establish a procedure and schedule for development and response actions; facilitate cooperation among participating parties; and ensure adequate assessment and achievement of cleanup levels for natural resources.	Navy conducted RI/FSs and response actions at IR sites, and notified federal and state natural resources trustees. EPA and state agencies attempted to expedite response actions and ensure protection of human health and environment.	An outline of the agreement between Navy, federal, and state agencies for procedures necessary to close HPS.
1990-1991	July 10, 1991	Water Quality Investigation of Stormwater Drainage	HLA	Facility-Wide	Characterize the chemical quality of stormwater runoff discharge to San Francisco Bay.	Collect sediment and storm drain water samples.	Storm drain sediments may be primary source of potential contamination to San Francisco Bay. Total metals may be released to the bay by stormwater.
1993-1994	April 8, 1994	Parcel B Site Inspection Report - Draft Final; this SI included IR-25, which is now part of Parcel C	PRC and HLA	Parcel B (including IR-25)	Evaluate whether contamination is present and if a release to the environment has occurred, characterize site-specific hydrogeologic conditions, and assess each site for possible inclusion in the IR Program.	Field investigation of IR-25 including dip tank and sump sampling and soil sampling beneath and around the building.	Further investigation was recommended to evaluate the lateral and vertical extent of contamination around the dip tank/sump.
January - August 1993	May 2, 1994	Site Inspection - Draft Final	HLA	Facility-Wide	Evaluate whether contamination is present and if a release to the environment has occurred, characterize site-specific hydrogeologic conditions, and assess each site for possible inclusion in the IR Program.	Nine sites identified during the PA were investigated. Geophysical surveys of suspected subsurface fuel lines; collection of soil and groundwater samples from borings; installation of monitoring wells and collection of groundwater samples; collection of shallow soil samples; trenching, mapping, inspection, and collection of samples from the steam line and sanitary sewer; video sanitary sewer; sump and floor scrap sampling.	For the nine sites evaluated, recommendations were made for additional investigation and the removal activities in the RI.
March - April 1994	July 15, 1994	Hunters Point Annex Environmental Baseline Survey Dry Dock 4	Mare Island Naval Shipyard	Parcel C	Document the environmental condition of the site prior to leasing to support Finding of Suitability to Lease.	Compile existing information and conduct interviews and visual site inspections of some facilities.	Dry Dock 4 contained hazardous substances and petroleum products, but required response actions have not yet occurred.

Activity Duration Dates	Report Date	Investigation Report Title	Company	Parcel C or Facility-Wide	Objective	Activity	Conclusions
1992-1996	June 3, 1996	Parcel B Remedial Investigation - Draft Final; this RI included IR-06 and IR-25, which are now part of Parcel C	PRC, HLA, LFR, U&A	Parcel B (including IR-06 and IR-25)	Determine the nature and extent of contaminanats at Parcel B from past activities, and the potential risks to human health and the environment from these contaminants.	Site inspections conducted at two sites and RIs conducted at 16 sites, including IR-06 and IR-25. Site inspections included literature searches, interviews with former on-site employees, geophysical surveys, aerial map surveys, installation of soil borings and monitoring wells, groundwater and soil sampling and analysis, and aquifer testing. Screening criteria: conduct HHRA and ERA. IR-06 tank farm removed.	IR-06 and IR-25 were receommended to be carried over to the FS for risk management and possible remediation evaluation.
1993-1997	July 14, 1997	HPS Redevelopment Plan	San Francisco Redevelopment Agency	Facility-Wide	Foster and stimulate economic growth; and provide for housing, infrastructural, and economic development.	Proposed redevelopment use plan for HPS.	Proposed a reuse plan for HPS with land use areas designated as educational/cultural, industrial, research and development, mixed use, maritime/industrial, residential, open space, or future development.
1988-1996	March 13, 1997	Parcel C Remedial Investigation Report - Draft Final	PRC, LFR, and U&A	Parcel C	Determine the nature and extent of chemicals at the 12 identified IR sites at Parcel C from past activities, and the potential risks to human health and the environment.	**Site assessment:** literature searches, interviews with former on-site employees, geophysical surveys, aerial map surveys, installation of soil borings and monitoring wells, groundwater and soil sampling and analysis, aquifer testing, and indoor air testing. **Removal actions:** AST, sandblast grit, and storm drain sediment. **Screening criteria:** conduct HHRA and ERA. **Other:** storm drain inspection and asbestos and lead abatement.	**Soil pathway:** For future residential and industrial land use scenarios, HHRA results for soil were established for each IR site. As a result, the 12 IR sites were recommended for evaluation in the FS Report for risk management and possible remediation. **Groundwater pathway:** Groundwater potentially poses a greater risk to marine organisms than to humans evaluated in the HHRA, and six IR sites were recommended for further evaluation.
May 2001 through June 2002	November 22, 2002	Petroleum Hydrocarbons Corrective Action Plan, Revised Draft	Tetra Tech and Washington Group International	Parcels C, D, and E	Develop cleanup strategies for TPH-related contamination by defining remediation criteria, identify areas for closure using these criteria, identify contaminated areas, and evaluate remedial alternatives.	Derived TPH cleanup criteria, discussed remedial action strategy, discussed TPH contamination in soil and groundwater, identified areas requiring corrective action, and evaluated remedial alternatives for 12 corrective action areas.	Proposed remedial alternatives for 12 corrective action areas with confirmation sampling, groundwater monitoring, and schedule.
February - September 2002	May 11, 2004	Parcel C Groundwater Summary Report Phase III Groundwater Data Gaps Investigation - Revised Final	Tetra Tech	Parcel C	Update previous assessment of groundwater conditions and address data gaps identified during and after the RI conducted in 1997. This information will be used to help evaluate groundwater remedial technologies in the Parcel C FS Report.	**Vertical and horizontal extent of plumes**: install 17 monitoring wells and collect samples; collect samples from 120 monitoring wells. **Horizontal hydraulic gradients and model**: measure water levels in 73 monitoring wells and perform aquifer tests. **Tidal effects on groundwater:** conduct tidal influence study and tidal mixing study.	Develop a comprehensive groundwater monitoring plan. Continue sampling at key wells to monitor migration and degradation of chemicals. Install additional wells to fully define plume and source contamination. Conduct pilot studies to evaluate feasibility of in-situ remediation technologies.

TABLE 2-3: HISTORY OF INVESTIGATIONS AT PARCEL C (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Activity Duration Dates	Report Date	Investigation Report Title	Company	Parcel C or Facility-Wide	Objective	Activity	Conclusions
2001 through 2004	August 31, 2004	Historical Radiological Assessment	Navy, RASO	Facility-Wide	Document the extent of past radiological operations at specific sites and residual effects theses operations may have had on the sites.	Review records and conduct interviews to assess the residual effect of radiological operations on buildings, structures, and open land areas. Designation of buildings, structures, and open areas as "non-impacted" or "impacted" sites. Non-impacted sites are considered to have no reasonable potential for residual radiological contamination. A designation of impacted means the history of the site indicates that radiological materials may have been used or stored there.	Twelve sites at Parcel C have a potential for radiological contamination based on historic information or are known to contain radiological contamination. At these sites, further investigation is required to verify the building or area is not contaminated, there is no potential for residual radiological contamination at levels exceeding natural background or fallout, or the site meets today's release standards. In 2006 and 2007, a sewer and storm drain radiological action was performed and lines were removed from Parcel C.
April 2004 through March 2005	March 23, 2006	Draft January to March 2005 Basewide Groundwater Monitoring Report - Annual	CDM/ Kleinfelder	Parcels C, D, and E	Assess the current groundwater conditions and the concentrations of chemicals in groundwater.	Perform quarterly monitoring for approximately 90 wells in Parcel D	Quarterly monitoring at Parcel C will be performed, and results reported in quarterly and annual reports. Current data indicated chemicals of concern are found in groundwater.
October 2005 through February 2006	November 1, 2006	Technical Memorandum for Contamination Delineation at Remedial Unit C5.	CE2 Corporation	Parcels B and C	Assess if remediation is required at Parcel B as a result of RU-C5 in Parcel C.	Evaluate soil gas to assess the location of current areas associated with groundwater RU-C5.	Results indicated dissolved-phase VOCs have migrated into Parcel B in some locations, although concentrations were low and did not exceed California MCLs. The data did not indicate migration of DNAPLs along the bedrock to the sampling locations. The TM recommended no additional site investigation work is needed to delineate subsurface contamination near the Parcel B/C boundary. However, additional characterization and monitoring may be needed to support future remedial actions.

Notes:

AST	Aboveground storage tank	NEESA	Naval Energy and Environmental Support Activity
EPA	U.S. Environmental Protection Agency	PCB	Polychlorinated biphenyl
ERA	Ecological risk assessment	PRC	PRC Environmental Management, Inc.
FS	Feasibility study	RASO	Radiological Affairs Support Office
HHRA	Human health risk assessment	RI	Remedial investigation
HLA	Harding Lawson Associates	RU	Remedial Unit
HPS	Hunters Point Shipyard	Tetra Tech	Tetra Tech EM Inc.
IR	Installation Restoration	TPH	Total petroleum hydrocarbons
LFR	Levine-Fricke-Recon	U&A	Uribe & Associates

TABLE 2-4: HISTORY OF REMOVAL ACTIONS AT PARCEL C
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Activity Duration Dates	Report Date	Investigation Report Title	Company	Parcel C or Facility-Wide	Objective	Activity	Conclusions
1991-1995	July 12, 1994	Draft Summary Phase I and II UST Removal and Closure-in-Place	PRC Environmental Management, Inc.	Facility-Wide	Removal or closure in place of 28 USTs at Parcel C.	Twenty-one of these USTs were removed and 7 USTs were closed in place. The USTs at Parcel C ranged in size from 122 to 210,000 gallons, and tank contents included gasoline, diesel, waste oil, hydraulic fluids solvents, or fuel oils.	The location, capacity, contents, and status of each UST at Parcel C are summarized in Table 2.3-1 of the Draft Final Parcel C RI Report.
Completed in 1995	June 18, 1995	Sandblast Grit Fixation Removal Action at Dry Dock 4	Battelle	Facility-Wide	Removal of sandblast grit from various locations at HPS.	In total, 4,665 tons of sandblast grit was collected and consolidated in Parcel E. Also, about 245 tons of sandblast grit was collected from eight small piles around HPS. An estimated 101 tons of grit was generated from within Parcel C at Dry Dock 4.	The grit was sent to an asphalt plant, where it was reused in the manufacture of asphalt.
September 1996 - October 1997	December 16, 1997	Field Summary Report, Storm Drain Sediment Removal Action- Draft	IT Corp.	Facility-Wide	Remove sediments contained in the storm drain system and associated catch basins/manholes in Parcels B, C, D, and E.	Removed all sediment and debris from the storm drain lines, catch basins, and manholes; performed pre- and post-cleaning video inspections of the pipelines; and water jetting of the pipelines, catch basins, and manholes.	Over 1,200 tons of hazardous sediments was removed from the storm drain system during the project. Based on laboratory analysis, approximately 680 tons of sediment was classified as California hazardous waste, and approximately 210 tons of sediment was classified as RCRA waste. Approximately 320 tons of sediment contained high concentrations of lead and PCBs, as a result, this sediment could not be landfilled and was incinerated.
May 1997	January 1, 1998	Field Summary Report Drainage Culvert Sediment Removal Action - Draft	IT Corp.	Facility-Wide	Rremove sediments contained in the drainage culverts under Dry Dock 4.	Sediment was removed from drainage culverts during two phases. Removal activities included using high-pressure water jetting, other mechanical methods, and hand chipping. Removed sediment was stockpiled on pads, sampled, and disposed of off site.	The approximate total amount of sediments removed during both phases was 260 tons. Sediments resulting from the removal action were disposed of off site. Approximately 800 feet of drainage culverts was cleaned, leaving approximately 1,350 feet to be cleaned in the future. Sediments from drainage culverts located on both sides of Dry Dock 4 could not be removed using mechanical methods. However, portside culvert was clean in accordance with project cleaning criteria.
April - October 1997	February 1, 1998	Project Completion Report Hunters Point Naval Shipyard Tank Farm Excavations - Draft	IT Corp.	Parcel C	Remove potential sources of high risk, cancer chemicals from soil at 19 sites at IR-06 (Tank Farm) to protect human health and the environment.	Soil was removed at 19 excavation sites; excavated soil was sampled; air monitoring, transportation and off-site disposal of excavated soil; and backfilling of sites.	Chemicals of concern were removed from 12 of the 19 sites to concentrations below target cleanup levels or HPALs.
August 1997 - February 1998	June 1, 1999	Completion Report Hunters Point Naval Shipyard Exploratory Excavation - Final Draft	IT Corp.	Facility-Wide	Remove and dispose of contaminated soil from 18 exploratory excavation sites throughout HPS.	Soil was excavated, confirmation samples were collected, contaminated soil was transported and disposed of off site, and excavations were backfilled.	Chemicals of concern were removed up to the parameters set in the work plan in all except four sites.

TABLE 2-4: HISTORY OF REMOVAL ACTIONS AT PARCEL C (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Activity Duration Dates	Report Date	Investigation Report Title	Company	Parcel C or Facility-Wide	Objective	Activity	Conclusions
May 2000 to August 2001	September 8, 2004	Parcel B Construction Summary Report Addendum - Draft	IT Corp.	Parcel B and portions of Parcel C	The excavation for the industrial drain line extended from the area between Buildings 123 and 134 in Parcel C to an end point west of Building 146 in Parcel B. The COPCs for this removal included benzo(a)pyrene, benzo(b)fluoranthene, cadmium, copper, and lead.	The Navy removed about 2,050 cubic yards of contaminated soil along the entire drain line excavation and backfilled it.	The Navy collected 51 confirmation samples during the 2000 to 2001 remedial action to characterize the excavation of the industrial drain line.
February 2001 - April 2002	July 12, 2002	Parcel C Time-Critical Removal Action - Final	Tetra Tech, Washington Group International, and IT Corp.	Facility-Wide	Eliminate the risk of exposure to hazardous substances to support future reuse of the property.	Removal actions occurred at 121 non-VOC and fuel line sites within Parcel C.	The exposure risk was reduced by this removal action. COPCs were detected in soil at concentrations above the applicable TCRA cleanup goals at 84 of the 121 TCRA sites. Soil was removed from 46 of these sites. COPCs in soil at the remaining 38 sites were delineated but the soil was not excavated. Steam and fuel lines were closed-in-place or removed.
October 1, 2003	February 20, 2003	Emergency Removal Action Closeout Report Encapsulation of Drainage Culvert Sediment at Dry Dock 4 - Final	Tetra Tech	Parcel C	Eliminate pathways for exposure of potential offshore wildlife by encapsulating contaminated sediment in two drainage culverts beneath Dry Dock 4.	The inlets and outlets of two culverts were filled to the maximum practical extent possible with a low-viscosity cement mixture to encapsulate contaminated sediment in the culverts.	Contaminated sediment in two culverts under Dry Dock 4 was successfully encapsulated.
May 2004 - January 2005	September 23, 2005	Final Total Petroleum Hydrocarbons Program Corrective Action Implementation Soil Removal	TPA/CKY	Parcels B, C, D, and E	Eliminate the risk of exposure to petroleum hydrocarbons and risk of hydrocarbons affecting San Francisco Bay. Support future reuse of the property.	Sites excavated based on contamination sources identified by previous sampling data.	Twelve of 22 identified sites were excavated, inclduding 2 sites at Parcel C. The two areas excavated were CAA3R in Block 20B and CAA2R in Block 24, both in IR-28. The excavations are roughly 4 feet deep, for a total of 51 cubic yards from CAA 3R, and 2 feet deep, for a total of 12 cubic yards from CAA 2R.
June 2006 - July 2007	Pending 2008	Draft Removal Action Closeout Report, Parcel B Sewer and Storm Drain Radiological Removal Action.	Tetra Tech EC, Inc.	Parcels B and C	Eliminate the risk of exposure to radiological contamination from sewers and storm drains at Parcel B. Support future reuse of the property.	Sewer and storm drain lines were removed in Parcel B, and where the lines extended into Parcel C near Building 134 and the former tank farm at IR-06.	A total of 1,892 linear feet (3,086 cubic yards) of pipeline was removed at Parcel C. The concrete, clay, and cement pipelines were tested for radiological contamination and disposed of in an appropriate disposal facility.

Notes:

Bay	San Francisco Bay	IT Corp.	International Technology Corporation
COPC	Chemical of potential concern	TCRA	Time-critical removal action
HPS	Hunters Point Shipyard	UST	Underground storage tank
IR	Installation Restoration	VOC	Volatile organic compound

TABLE 2-5: UST SUMMARY INFORMATION
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

UST Site[1]	Building No./ Tank No.	RB	Tank Capacity (gallons)	Tank Dimensions (feet)[c]	Depth of Excavation (feet bgs)	Date of Removal/ Closure-in-Place	Groundwater Depth (feet bgs)	Historical Contents	Current Status
UST 4	B-203/ Tank S-203	RB-23	500	4ϕ x 5.5L	6	8/1/91	6	Gasoline	Removed
UST 5	B-203/ Tank S-209	RB-26	210,000	68ϕ x 8D	11[a]	10/21/91	NA	Boiler oil	Closed in place
	B-203/ Tank S-210		14,000	12Wx20Lx8D	11[b]	10/21/91	NA	Brine	Closed in place
UST 6	B-203/ Tank S-211	RB-23	3,000	6ϕ x 14.5L	10	6/9/93	10	Boiler oil	Removed
	B-203/ Tank S-212		4,500	6ϕ x 21.5L	12	6/2/93	12	Boiler oil	Removed
	B-203/ Tank S-213		35,000	27.5ϕ x 10D	5[b]	8/31/93	10	Water	Removed
UST 7	B-205/ Tank HPA-06	RB-22	24,000	15ϕ x 18D	20[a]	8/31/93	9.5	Water	Closed in place
UST 8	B-205/ Tank S-214		22,000	15ϕ x 22D	26[a]	9/23/91	NA	Boiler oil	Closed in place
UST 9	B-211/ Tank HPA-01	COS-3	122	2ϕ x 5L	5	5/19/93	NA	Diesel	Removed
UST 10	B-231/ Tank HPA-10	COS-2	6,500	7ϕ x 23L	9	8/4/93	9	Boiler oil	Removed
UST 11	B-231/ Tank HPA-11		1,600	5ϕ x 10L	7	6/9/93	NA	Diesel	Removed
UST 12	B-231/ Tank HPA-12		750	4ϕ x 8L	6[a]	8/31/93	NA	Diesel	Closed in place

TABLE 2-5: UST SUMMARY INFORMATION (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

UST Site[1]	Building No./ Tank No.	RB	Tank Capacity (gallons)	Tank Dimensions (feet)[c]	Depth of Excavation (feet bgs)	Date of Removal/ Closure-in-Place	Groundwater Depth (feet bgs)	Historical Contents	Current Status
UST 13	B-231/ Tank HPA-16	COS-2	7,2006	Wx20Lx8D	8[a]	4/30/93	NA	Water	Closed in place
UST 14	B-231/ Tank HPA-17		1,700	5ϕ x 12L	6	5/25/93	NA	Diesel	Removed
UST 15	B-251/ Tank S-219	20B	1,000	4ϕ x 11L	8	6/2/93	NA	Solvent	Removed
UST 16	B-251/ Tank S-251		1,000	4ϕ x 11L	5	7/30/91	NA	Solvent	Removed
UST 17	B-253/ Tank HPA-02	25	1,500	5ϕ x 10L	8.5	8/5/93	8.5	Boiler oil	Removed
	B-253/ Tank HPA-03		1,500	5ϕ x 10L	8.5	8/5/93	8.5	Boiler oil	Removed
UST 18	B-253/ Tank HPA-04		1,000	4ϕ x 12L	9	5/19/93	9	Diesel and gasoline	Removed
	B-253/ Tank HPA-05		1,000	4ϕ x 12L	9	5/19/93	9	Diesel and gasoline	Removed
UST 19	B-253/ Tank S-001		3,000	6ϕ x 14.5L	9	8/29/91	8.8	Gasoline	Removed
	B-253/ Tank S-002		3,000	6ϕ x 14.5L	9	8/29/91	8.8	Gasoline	Removed
	B-253/ Tank S-003		3,000	6ϕ x 14.5L	9	8/29/91	8.8	Diesel	Removed
	B-253/ Tank S-004		3,000	6ϕ x 14.5L	9	8/29/91	8.8	Gasoline	Removed

TABLE 2-5: UST SUMMARY INFORMATION (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

UST Site[1]	Building No./ Tank No.	RB	Tank Capacity (gallons)	Tank Dimensions (feet)[c]	Depth of Excavation (feet bgs)	Date of Removal/ Closure-in-Place	Groundwater Depth (feet bgs)	Historical Contents	Current Status
UST 20	B-270/271/ Tank S-215	24	25,000	12ϕ x 30L	15[a]	9/12/91	NA	Paint thinner	Closed in place
UST 21	B-272/281/ Tank HPA-07		500	4ϕ x 6L	8	6/3/93	8	Waste oil	Removed
UST 22	B-281/ Tank HPA-33		750	4ϕ x 8L	9	5/24/93	9	Solvent (chlorinated)	Removed
	B-281/ Tank HPA-34		750	4ϕ x 8L	6	5/24/93	NA	Solvent	Removed

Notes:

1 USTs 1 through 3 are not located in Parcel C. None of the USTs have received a closure letter.

a For tanks closed in place, depth to tank bottom shown
b Tank only partially removed because of the presence of groundwater
c Tank dimensions approximate

ϕ Diameter
bgs Below ground surface
D Depth
L Length
NA Not available
RB Redevelopment block
UST Underground storage tank
W Width

TABLE 2-6: SUMMARY OF SAMPLING DURING PHASE I AND II UST REMOVALS AND CLOSURES IN PLACE
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

UST Site	Building No./ Tank No.	RB	Samples Collected	Results[1]	Decision[2]
UST 4	B-203/ Tank S-203	RB-23	One soil sample at GW interface (5 feet bgs) One GW sample after excavation (6 feet bgs)	Soil: No organic chemicals detected GW: Low levels of chlorinated and brominated hydrocarbons (0.003 to 1 mg/L) and low levels of toluene (0.005 mg/L)	Removed and closed in 1991 during Phase I; additional soil and GW investigation recommended
UST 5	B-203/ Tank S-209	RB-26	Three soil samples at 3.5 feet bgs No GW samples	Soil: Organic lead detected; Aroclor-1260 at 1.1 mg/kg and TPH-d at two locations up to 130 mg/kg	Closed in place in 1991 during Phase I; additional soil and GW investigation recommended
	B-203/ Tank S-210		Four soil samples at 4 feet bgs No GW samples	Soil: Fluoranthene (0.18 mg/kg), pyrene (0.26 mg/kg), and TPH-g (11 mg/kg)	Tank cleaned, asbestos removed, backfilled, and closed in place in 1991 during Phase I; additional soil and GW investigation recommended
UST 6	B-203/ Tank S-211	RB-23	Two soil samples at 8 feet bgs and one soil sample at 10 feet bgs One GW sample at 10 feet bgs	Soil: VOCs, SVOCs, pesticides, and TPH detected GW: Endrin at 0.000079 mg/L and TPH at 3.2 and 0.65 mg/L	Removed and closed in 1993 during Phase II; additional soil and GW investigation recommended
	B-203/ Tank S-212		One soil sample at 12 feet bgs and three soil samples at 9 feet bgs One GW sample at 12 feet bgs	Soil: Organic lead detected; SVOCs ranging from 1.2 mg/kg to 200 mg/kg and TPH from 720 to 5,000 mg/kg GW: VOCs, SVOCs, pesticides, and TPH all detected	Removed and closed in 1993 during Phase II; additional soil and GW investigation recommended

TABLE 2-6: SUMMARY OF SAMPLING DURING PHASE I AND II UST REMOVALS AND CLOSURES IN PLACE (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

UST Site	Building No./ Tank No.	RB	Samples Collected	Results[1]	Decision[2]
UST 6	B-203/ Tank S-213	RB-23	Three soil samples at 6, 6.5, and 13 feet bgs One GW sample at 10 feet bgs	Soil: carbon disulfide at 0.001 mg/kg, SVOCs from 0.036 to 2.3 mg/kg, and TPH at 5.9 and 500 mg/kg GW: Acenaphthene, pentachlorophenol, and phenanthrene at 0.002 mg/kg and chloroform at 0.004 mg/kg	Most of upper portion removed and closed in 1993 during Phase II; additional soil and GW investigation recommended
UST 7	B-205/ Tank HPA-06	RB-22	Three soil samples at 15.5, 11, and 10.5 feet bgs No GW samples	Soil: No organic chemicals detected	Closed in place in 1993 during Phase II; minimal additional soil and GW investigation recommended
UST 8	B-205/ Tank S-214		Three soil samples at 3.5 to 4.5 feet bgs No GW samples	Soil: Pyrene at 0.28 mg/kg, bis(2-ethylhexyl)phthalate at 0.580 mg/kg, and TPH at a maximum of 540 mg/kg	Closed in place in 1991 during Phase I; limited additional soil and GW investigation recommended
UST 9	B-211/ Tank HPA-01	COS-3	Two soil samples at 5 feet bgs No GW samples	Soil: No organic chemicals detected	Removed and closed in 1993 during Phase II; no further investigation recommended
UST 10	B-231/ Tank HPA-10	COS-2	One soil sample at 9 feet bgs and two soil samples at 7 feet bgs One GW sample at 9 feet bgs	Soil: SVOCs from 0.049 mg/kg for anthracene to 15 mg/kg of pyrene, TCE at 0.002 mg/kg, and TPH up to 630 mg/kg GW: SVOCs from 0.002 mg/L of 2-methylnaphthalene and carbazole to 0.074 mg/L of pyrene and TPH up to 2.5 mg/L	Removed and closed in 1993 during Phase II; limited additional soil and GW investigation recommended

TABLE 2-6: SUMMARY OF SAMPLING DURING PHASE I AND II UST REMOVALS AND CLOSURES IN PLACE (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

UST Site	Building No./ Tank No.	RB	Samples Collected	Results[1]	Decision[2]
UST 11	B-231/ Tank HPA-11	COS-2	Two soil samples at 7 feet bgs No GW samples	Soil: Chrysene up to 0.081 mg/kg, phenol up to 0.110 mg/kg, TCE at 0.002 mg/kg, and TPH up to 130 mg/kg	Removed and closed in 1993 during Phase II; additional soil and GW investigation recommended
UST 12	B-231/ Tank HPA-12	COS-2	Two soil samples at 10.5 feet bgs and one soil sample at 10 feet bgs No GW samples	Soil: SVOCs from minimum of 0.050 mg/kg of anthracene to a maximum of 0.270 mg/kg of phenanthrene, 1,2-DCE and PCE at 0.002 mg/kg, Aroclor-1260 at 0.110 mg/kg, and TPH at 25 mg/kg	Closed in place in 1993 during Phase II; additional soil and GW investigation recommended
UST 13	B-231/ Tank HPA-16	COS-2	Three soil samples at 9, 10.5, and 11.5 feet bgs No GW samples	Soil: SVOCs at a maximum of 0.600 mg/kg, chloroethane and vinyl chloride at 0.005 mg/kg, and TCE at 0.001 mg/kg	Closed in place in 1993 during Phase II; additional soil and GW investigation recommended
UST 14	B-231/ Tank HPA-17	COS-2	Three soil samples at 6 feet bgs No GW samples	Soil: SVOCs at a minimum of 3.80 mg/kg of fluoranthene to a maximum of 5.60 mg/kg of pyrene and TPH at a maximum of 2,300 mg/kg	Removed and closed in 1993 during Phase II; additional soil and GW investigation recommended
UST 15	B-251/ Tank S-219	COS-2	Two soil samples at 8 feet bgs No GW samples	Soil: No organic chemicals detected	Removed and closed in 1993 during Phase II; no further investigation recommended
UST 16	B-251/ Tank S-251	20B	Two soil samples at 8 feet bgs No GW samples	Soil: No organic chemicals detected	Removed and closed in 1991 during Phase I; additional soil and GW investigation recommended

TABLE 2-6: SUMMARY OF SAMPLING DURING PHASE I AND II UST REMOVALS AND CLOSURES IN PLACE (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

UST Site	Building No./ Tank No.	RB	Samples Collected	Results[1]	Decision[2]
UST 17	B-253/ Tank HPA-02	25	Two soil samples at 7 feet bgs and one soil sample at 8.5 feet bgs One GW sample at 8.5 feet bgs	Soil: VOCs, SVOCs, PCBs, and TPH detected GW: VOCs, SVOCs, PCBs, and TPH detected	Removed and closed in 1993 during Phase II; limited additional soil and GW investigation recommended
	B-253/ Tank HPA-03		Two soil samples at 7 feet bgs and one soil sample at 8.5 feet bgs One GW sample at 8.5 feet bgs	Soil: VOCs, SVOCs, pesticides, PCBs, and TPH detected GW: Di-n-butylphthalate and phenanthrene at 0.001 mg/L, VOCs from a minimum of 0.001 mg/L of toluene to 2.900 mg/L of TCE, and TPH at 0.50 mg/L	Removed and closed in 1993 during Phase II; additional soil and GW investigation recommended
UST 18	B-253/ Tank HPA-04 B-253/ Tank HPA-05		Four soil samples at 9 feet bgs One GW sample at 9 feet bgs	Soil: TPH at 60 and 150 mg/kg GW: No organic chemicals detected	Removed and closed in 1993 during Phase II; additional soil and GW investigation recommended
UST 19	B-253/ Tank S-001 B-253/ Tank S-002 B-253/ Tank S-003 B-253/ Tank S-004		Eight soil samples at 7 feet bgs and four soil samples at 2 feet bgs One GW sample at 8 feet 8 inches bgs	Soil: VOCs detected in two samples, SVOCs detected in five samples, and TPH detected in seven samples GW: fluorene at 0.007 mg/L, naphthalene at 0.049 mg/L, VOCs from 0.140 mg/L of toluene to 0.530 mg/L of xylene, and TPH at a maximum of 130 mg/L	Removed and closed in 1991 during Phase I; additional soil and GW investigation recommended

TABLE 2-6: SUMMARY OF SAMPLING DURING PHASE I AND II UST REMOVALS AND CLOSURES IN PLACE (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

UST Site	Building No./ Tank No.	RB	Samples Collected	Results[1]	Decision[2]
UST 20	B-270/271/ Tank S-215	24	Three soil samples at 8 feet bgs and two soil samples at 6 feet bgs No GW samples	Soil: SVOCs detected in all samples, 4,4'-DDT detected in three samples from 0.032 to 0.087 mg/kg, and TPH detected in all samples at a maximum of 2,500 mg/kg	Closed in place in 1991 during Phase I; additional soil and GW investigation recommended
UST 21	B-272/281/ Tank HPA-07		Two soil samples at 7 feet bgs One GW sample at 8 feet bgs	Soil: 2-methylnaphthalene at 7.4 mg/kg, acetone at 0.022 mg/kg and methylene chloride at 0.006 mg/kg, and TPH at a maximum of 2,500 mg/kg GW: VOCs, SVOCs, pesticides, and TPH detected	Removed and closed in 1993 during Phase II; additional soil and GW investigation recommended
UST 22	B-281/ Tank HPA-33		Four soil samples at 9 feet bgs One GW sample at 9 feet bgs	Soil: VOCs from 0.002 mg/kg to 2.200 mg/kg, SVOCs from 0.040 mg/kg to 0.590 mg/kg, o-Terphenyl at 87 mg/kg, and an extractable hydrocarbon at 4 mg/kg GW: VOCs from 0.029 mg/L to 2.2 mg/L, SVOCs from 0.017 mg/L to 0.18 mg/L, Aroclor-1254 at 0.0045 mg/L, and TPH from 4 mg/kg to 87 mg/kg	Removed and closed in 1993 during Phase II; additional soil and GW investigation recommended
	B-281/ Tank HPA-34		2 soil samples at 6 feet bgs	Soil: SVOCs from 0.056 mg/kg to 0.980 mg/kg, xylene at 0.004 mg/kg and 4-methyl-2-pentanone at 0.009 mg/kg, o-terphenyl at 97 mg/kg, and an extractable hydrocarbon at 36 mg/kg	Removed and closed in 1993 during Phase II; additional soil and GW investigation recommended

TABLE 2-6: SUMMARY OF SAMPLING DURING PHASE I AND II UST REMOVALS AND CLOSURES IN PLACE (CONTINUED)

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Notes:

1	Metals were detected in all samples; background concentrations have changed over the course of the UST investigations so metals are not listed in the table. Metals and organic chemical results can be found in Appendix B.
2	Results of additional investigation included in the HHRA (Section 3.0).
bgs	Below ground surface
COS	Parcel C open space
DCE	Dichloroethene
DDT	Dichlorodiphenyltrichloroethane
GW	Groundwater
HHRA	Human health risk assessment
mg/kg	Milligram per kilogram
mg/L	Milligram per liter
NA	Not available
PCB	Polychlorinated biphenyl
PCE	Tetrachloroethene
RB	Redevelopment block
SVOC	Semivolatile organic compound
TCE	Trichloroethene
TPH	Total petroleum hydrocarbons
UST	Underground storage tank
VOC	Volatile organic compound

TABLE 2-7: AST SUMMARY INFORMATION
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Tank No.	Building No.	Redevelopment Block	Removal/Closure-in-Place Documented	Historical Use/Description	Current Status
1	Tank Farm	RB-10	Navy 1990	Diesel fuel tank (12,012 gallons)	Removed
2	Tank Farm	RB-10	Navy 1990	Diesel fuel tank (12,012 gallons)	Removed
3	Tank Farm	RB-10	Navy 1990	Diesel fuel tank (12,012 gallons)	Removed
4	Tank Farm	RB-10	Navy 1990	Diesel fuel tank (12,012 gallons)	Removed
5	Tank Farm	RB-10	Navy 1990	Diesel fuel tank (12,012 gallons)	Removed
6	Tank Farm	RB-10	Navy 1990	Diesel fuel tank (12,012 gallons)	Removed
7	Tank Farm	RB-10	Navy 1990	Solvent tank (12,012 gallons)	Removed
8	Tank Farm	RB-10	Navy 1990	Solvent tank (12,012 gallons)	Removed
9	Tank Farm	RB-10	Navy 1990	Lube oil tank (12,012 gallons)	Removed
10	Tank Farm	RB-10	Navy 1990	Diesel fuel tank (2,100,000 gallons)	Removed
A203-1A	203	RB-23	IT Corp. 2001	Contained diesel (1,600 gallons)	Removed
A203-1B	203	RB-23	IT Corp. 2001	Contained water/trace TPH (1,200 gallons)	Removed
A203-2B	203	RB-23	IT Corp. 2001	Contained sulfuric acid (600 gallons)	Removed
A203-7	203	RB-23	IT Corp. 2001	Exterior of tank encrusted with a liquid and white flaky material	Removed
A-211	211	RB-25	IT Corp. 2001	Possibly contained soap ("soap" written on the side of tank)	Removed
A235	235	RB-26	IT Corp. 2001	Contained diesel product (100 gallons)	Removed
203-AST-001[a]	203	RB-23	Navy 2004	Mixing tank with crust	Removed
203-AST-002[a]	203	RB-23	Navy 2004	Mixing tank with crust	Removed
203-AST-003[a]	203	RB-23	Navy 2004	Mixing tank	Removed
203-AST-004[a]	203	RB-23	Navy 2004	Mixing tank	Removed

TABLE 2-7: AST SUMMARY INFORMATION (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Tank No.	Building No.	Redevelopment Block	Removal/Closure-in-Place Documented	Historical Use/Description	Current Status
203-AST-005[a]	203	RB-23	Navy 2004	Mixing tank	Removed
203-AST-006[a]	203	RB-23	Navy 2004	1,000-Gallon wooden tank on shed roof	Removed
203-AST-007[a]	203	RB-23	Navy 2004	Wooden cooling tower	Removed
203-AST-008[a]	203	RB-23	Navy 2004	Water treatment vessel	Removed
203-AST-009[a]	203	RB-23	Navy 2004	Water treatment vessel	Removed
203-AST-010[a]	203	RB-23	Navy 2004	Pressure vessel	Depressurized and disabled
203-AST-011[a]	203	RB-23	Navy 2004	Pressure vessel	Depressurized and disabled
203-AST-012[a]	203	RB-23	Navy 2004	Water tank pressure vessel	Depressurized and disabled
205-AST-001[a]	205	RB-22	Navy 2004	Exterior 500-gallon tank	Removed
205-AST-002[a]	205	RB-22	Navy 2004	Part of air pressure system (large tank)	No action
205-AST-003[a]	205	RB-22	Navy 2004	Part of air pressure system (small tank)	No action
211-AST-001[a]	211	RB-25/COS-2	Navy 2004	200-gallon exterior filter tank (with liquid)	No action (address after radiological work)
211-AST-002[a]	211	RB-25/COS-2	Navy 2004	100-gallon exterior tank	No action (address after radiological work)
215-AST-001[a]	215	NA	Navy 2004	50-gallon propane tank	Removed
215-AST-003[a]	215	NA	Navy 2004	500-gallon propane tank	Used by HPS Fire Department
224-AST-001[a]	224	RB-25/COS-3	Navy 2004	Oil/water separator (300 gallons)	Removed
231-AST-001[a]	231	RB-22/COS-2	Navy 2004	Tank behind pipe header on floor 1	Removed

TABLE 2-7: AST SUMMARY INFORMATION (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Tank No.	Building No.	Redevelopment Block	Removal/Closure-in-Place Documented	Historical Use/Description	Current Status
231-AST-002[a]	231	RB-22/COS-2	Navy 2004	Tank behind pipe header on floor 1	Removed
231-AST-003[a]	231	RB-22/COS-2	Navy 2004	Tank behind pipe header on floor 1	Removed
231-AST-004[a]	231	RB-22/COS-2	Navy 2004	Tank behind pipe header on floor 1	Removed
231-AST-005[a]	231	RB-22/COS-2	Navy 2004	100- to 150-gallon tank on subfloor, floor 1	Removed
231-AST-006[a]	231	RB-22/COS-2	Navy 2004	100- to 150-gallon tank on subfloor, floor 1	Removed
231-AST-007[a]	231	RB-22/COS-2	Navy 2004	100- to 150-gallon tank on subfloor, floor 1	Removed
231-AST-008[a]	231	RB-22/COS-2	Navy 2004	100- to 150-gallon tank on subfloor, floor 1	Removed
231-AST-009[a]	231	RB-22/COS-2	Navy 2004	Wall mount tank in auxiliary equipment room	Removed
231-AST-010[a]	231	RB-22/COS-2	Navy 2004	Tank 1/6 in auxiliary equipment room	Removed
231-AST-011[a]	231	RB-22/COS-2	Navy 2004	Tank 2/6 in auxiliary equipment room	Removed
231-AST-012[a]	231	RB-22/COS-2	Navy 2004	Tank 3/6 in auxiliary equipment room	Removed
231-AST-013[a]	231	RB-22/COS-2	Navy 2004	Tank 4/6 in auxiliary equipment room	Removed
231-AST-014[a]	231	RB-22/COS-2	Navy 2004	Tank 5/6 in auxiliary equipment room	Removed
231-AST-015[a]	231	RB-22/COS-2	Navy 2004	Tank 6/6 in auxiliary equipment room	Removed
231-AST-016[a]	231	RB-22/COS-2	Navy 2004	50-Gallon phosphate tank	Removed

TABLE 2-7: AST SUMMARY INFORMATION (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Tank No.	Building No.	Redevelopment Block	Removal/Closure-in-Place Documented	Historical Use/Description	Current Status
231-AST-017[a]	231	RB-22/COS-2	Navy 2004	50-Gallon caustic soda tank	Removed
231-AST-018[a]	231	RB-22/COS-2	Navy 2004	50-Gallon hydrazine tank	Removed
231-AST-019[a]	231	RB-22/COS-2	Navy 2004	Tank in auxiliary equipment room	Removed
231-AST-020[a]	231	RB-22/COS-2	Navy 2004	Pressure vessel 1/2 (boiler room)	Depressurized and disabled
231-AST-021[a]	231	RB-22/COS-2	Navy 2004	Pressure vessel 2/2 (boiler room)	Depressurized and disabled
231-AST-22[a]	231	RB-22/COS-2	Navy 2004	Pressure vessel on floor 1	Depressurized and disabled
236-AST-001[a]	236	NA	Navy 2004	Cut down tank (with scrap)	Removed
236-AST-002[a]	236	NA	Navy 2004	Pressure vessel	Part of saltwater pumping system
241-AST-001[a]	241	RB-18	Navy 2004	Deep quench tank	Removed
241-AST-002[a]	241	RB-18	Navy 2004	Quench tank	Removed
241-AST-003[a]	241	RB-18	Navy 2004	Large square tank	Removed
241-AST-004[a]	241	RB-18	Navy 2004	Hopper	Removed
251-AST-001[a]	251	RB-20B	Navy 2004	3-foot by 4-foot solvent tank	Removed
251-AST-002[a]	251	RB-20B	Navy 2004	20,000-Gallon baker tank	Removed
253-AST-001[a]	253	RB-25	Navy 2004	Possibly an air tank on floor 1	No action (address after radiological work)
253-AST-002[a]	253	RB-25	Navy 2004	Oil tank/pump on floor 1	No action (address after radiological work)
253-AST-003[a]	253	RB-25	Navy 2004	7-foot by 7-foot by 7-foot tank in prep room (floor 1)	No action (address after radiological work)

TABLE 2-7: AST SUMMARY INFORMATION (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Tank No.	Building No.	Redevelopment Block	Removal/Closure-in-Place Documented	Historical Use/Description	Current Status
253-AST-004[a]	253	RB-25	Navy 2004	7-foot by 7-foot by 7-foot tank in prep room (floor 1)	No action (address after radiological work)
253-AST-005[a]	253	RB-25	Navy 2004	7-foot by 7-foot by 7-foot tank in prep room (floor 1)	No action (address after radiological work)
253-AST-006[a]	253	RB-25	Navy 2004	5-foot by 10-foot by 5-foot tank	No action (address after radiological work)
253-AST-007[a]	253	RB-25	Navy 2004	15- to 20-Gallon tank	No action (address after radiological work)
253-AST-008[a]	253	RB-25	Navy 2004	Oil tank/pump	No action (address after radiological work)
253-AST-009[a]	253	RB-25	Navy 2004	Small tank with debris in "prep room" (floor 1)	No action (address after radiological work)
253-AST-010[a]	253	RB-25	Navy 2004	Small tank with debris in "prep room" (floor 1)	No action (address after radiological work)
258-AST-001	258	RB-20A	Navy 2004	Tank (north, upper)	Removed
258-AST-002	258	RB-20A	Navy 2004	Tank (north, lower)	Removed
258-AST-003	258	RB-20A	Navy 2004	Tank (south, upper)	Removed
258-AST-004	258	RB-20A	Navy 2004	Tank (south, lower)	Removed
258-AST-005	258	RB-20A	Navy 2004	Tank (with possible ACM wrap)	Removed
258-AST-006	258	RB-20A	Navy 2004	Pressure vessel	Removed
258-AST-007	258	RB-20A	Navy 2004	Pressure vessel	Removed
258-AST-008	258	RB-20A	Navy 2004	Pressure vessel	Removed
258-AST-009	258	RB-20A	Navy 2004	Pressure vessel	Removed
258-AST-010	258	RB-20A	Navy 2004	100-gallon tank	Removed

TABLE 2-7: AST SUMMARY INFORMATION (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Tank No.	Building No.	Redevelopment Block	Removal/Closure-in-Place Documented	Historical Use/Description	Current Status
258-AST-011	258	RB-20A	Navy 2004	200 ± gallon compressed air tank	Depressurized and disabled
271-AST-001[a]	271	RB-24	Navy 2004	Acid bath/dip tank	Removed
281-AST-001[a]	281	RB-24	Navy 2004	Tank/machine base	Removed
281-AST-002[a]	281	RB-24	Navy 2004	Tank/machine base	Removed
281-AST-003[a]	281	RB-24	Navy 2004	Tank/machine base	Removed
281-AST-004[a]	281	RB-24	Navy 2004	Dip tank	Removed
281-AST-005[a]	281	RB-24	Navy 2004	Dip tank	Removed
281-AST-006[a]	281	RB-24	Navy 2004	Dip tank	Removed
281-AST-007[a]	281	RB-24	Navy 2004	Dip tank	Removed
282-AST-001[a]	282	NA	Navy 2004	Mixing tank (w/residue)	Removed
282-AST-002[a]	282	NA	Navy 2004	Mixing tank (w/residue)	Removed
282-AST-003[a]	282	NA	Navy 2004	200 ± gallon tank (w/residue)	Removed
282-AST-004[a]	282	NA	Navy 2004	Pressure vessel	Depressurized
282-AST-005[a]	282	NA	Navy 2004	Pressure vessel	Depressurized
DD4-AST-001[a]	DD4	CMI-1	Navy 2004	AST on crane F5	No action
DD4-AST-002[a]	DD4	CMI-1	Navy 2004	Pressure vessel on unnumbered crane	No action
DD4-AST-003[a]	DD4	CMI-1	Navy 2004	Propane tank (1,250 gallons)	Removed
DD4-AST-004[a]	DD4	CMI-1	Navy 2004	Propane tank (1,250 gallons)	Removed
DD4-AST-005[a]	DD4	CMI-1	Navy 2004	Propane tank (1,250 gallons)	Removed
DD4-AST-006[a]	DD4	CMI-1	Navy 2004	Oil/water system separator tank	Removed
DD4-AST-007[a]	DD4	CMI-1	Navy 2004	15-Gallon portable tank	Removed
DD4-AST-008a	DD4	CMI-1	Navy 2004	Water/condensation tank	Removed

TABLE 2-7: AST SUMMARY INFORMATION (CONTINUED)

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Tank No.	Building No.	Redevelopment Block	Removal/Closure-in-Place Documented	Historical Use/Description	Current Status
DD4-AST-009[a]	DD4	CMI-1	Navy 2004	Tank in pump room	Removed
DD4-AST-010[a]	DD4	CMI-1	Navy 2004	Tank in pump room	Removed
DD4-AST-011[a]	DD4	CMI-1	Navy 2004	Tank in pump room	Removed
134-BAT-001[a]	134	RB-10	Navy 2004	Batch tank	Removed
215-UCT-002[a]	215	NA	Navy 2004	Contents: oily waste (50-gallon tank)	Removed
Tank-1	258	RB-20A	IT Corp. 2001	Ferrous pickle tank	Removed
Tank-2	258	RB-20A	IT Corp. 2001 Hot	water rinse tank	Removed
Tank-3	258	RB-20A	IT Corp. 2001	Ferrous caustic tank	Removed
Tank-4	258	RB-20A	IT Corp. 2001	Ferrous passivator tank	Removed
Tank-5	258	RB-20A	IT Corp. 2001	Brick, nonferrous tank	Removed
Tank-6	258	RB-20A	IT Corp. 2001	Chromate sulfuric acid tank	Removed
Tank-7	258	RB-20A	IT Corp. 2001	Nonferrous caustic tank	Removed
Tank-8	258	RB-20A	IT Corp. 2001	Carbon removing tank	Removed
Tank -9	258	RB-20A	IT Corp. 2001	Cold water rinse tank	Removed
Tank-10	258	RB-20A	IT Corp. 2001	Trisodium dip tank	Removed
Tank-11	258	RB-20A	IT Corp. 2001	Ferrous pickle tank	Removed

Notes:

a AST is not shown on the figures in the Draft Final Revised Feasibility Study Report; however, it is documented in the Draft Final Post-Construction Report (Navy 2004).

AST Aboveground storage tank
CMI Parcel C maritime/industrial
COS Parcel C open space
DD4 Dry Dock 4
IT Corp. International Technology Corporation
NA Not applicable
RB Redevelopment block
TPH Total petroleum hydrocarbons

References:

IT Corp. 2001. "Tank Closure Report, Aboveground/Underground Tank Cleaning and Removal, Hunters Point Shipyard, San Francisco, California." July 20.

Navy. 1990. "Removal Action Tank Farm (IR-6), Volume I – Work Plan, Naval Station Treasure Island, Hunters Point Annex, San Francisco." Prepared by Naval Facilities Engineering Command, Western Division. September 13.

Navy. 2004. "Draft Final Post-Construction Report, Decontaminate Process Equipment, Conduct Waste Consolidation, and Provide Asbestos Services in Parcels B, C, D, and E." Revision 0. Prepared by Naval Facilities Engineering Command, Southwest Division. July 9.

TABLE 2-8: TCRA SITE HISTORY
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block[a]	IR Site Number	Remediation or De Minimis Area[b]	Remediation Subarea[c]	RMR Recommendation[d]	Excavation Type	Pre-FS Status[e]	Volume Excavated (cubic yard)	Excavation COPCs[f]
RB-11	IR-25	25-1 (includes DM B3924)	250101	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Aroclor-1260
RB-11	IR-25	25-1	250102	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Benzo(a)anthracene
RB-11	IR-25	25-2	250201	Action	TCRA Delineation	Partially excavated; remainder to be addressed in Revised FS Report	17	Chromium, hexavalent chromium, copper, lead, manganese, and zinc; Aroclor-1260; and combined TPH
RB-11	IR-25	25-3	250301	Action	TCRA Delineation	Site delineated; to be addressed in	Not excavated	Antimony, chromium, and hexavalent chromium
RB-11	IR-25	DM B3926	DM B3926	Action	TCRA Delineation	Manganese-only site	Not excavated	Manganese
RB-13	IR-58	58-1	580101	Action	TCRA Delineation	Excavated and backfilled	46	Copper and manganese
RB-13	IR-58	58-2	580201	Action	TCRA Delineation	Site delineated; excavation not required	Not excavated	Manganese
RB-13	IR-58	28-2	580202	Action	TCRA Delineation	Site delineated; excavation not required	Not excavated	Manganese
RB-13	IR-58	DM 7527	DM 7527	Action	TCRA Delineation	Site delineated; excavation not required	Not excavated	Chromium and hexavalent chromium
RB-13	IR-58	DM 7727	DM 7727	Action	TCRA Delineation	Excavated and backfilled	27	Antimony, chromium, and hexavalent chromium
RB-13	IR-58	DM 7728	DM 7728	Action	TCRA Delineation	Site delineated; excavation not required	Not excavated	Manganese
RB-13	IR-58	DM 7927	DM 7927	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-13	IR-58	DM 7930	DM 7930	Action	TCRA Delineation	Manganese-only site	Not excavated	Manganese
RB-13	IR-58	DM 8029	DM 8029	Action	TCRA Delineation	Excavated and backfilled	25	Aluminum, cadmium, and manganese
RB-13	IR-58	DM 8127	DM 8127	Action	TCRA Delineation	Excavated and backfilled	4	Lead
RB-13	IR-58	DM 8130	DM 8130	Action	Data Gaps Sampling[g]	Site delineated; excavation not required	Not excavated	Benzo(a)pyrene
RB-13	IR-58	NA	EE-11	Completed prior to RMR	Exploratory Excavation	Excavated and backfilled	17	Mercury and Aroclor-1242 and Aroclor-1254
RB-18	IR-29	DM 8235	DM 8235	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-18	IR-30	30-1	300101	Action	TCRA Delineation	Transferred to TPH Program	Not excavated	Combined TPH
RB-18	IR-30	30-1	300102	Action	TCRA Delineation	Manganese-only site	Not excavated	Manganese
RB-18	IR-30	30-1	300103	Action	TCRA Delineation	Site delineated; to be addressed in	Not excavated	Benzene and combined TPH
RB-18	IR-30	30-1	300104	Action	TCRA Delineation	Excavated and backfilled	62	Copper, molybdenum, nickel, and zinc
RB-18	IR-30	30-1	300105	Action	TCRA Delineation	Site delineated, to be addressed in Revised FS Report	Not excavated	Benzene
RB-18	IR-30	30-1	300106	Action	TCRA Delineation	Excavated and backfilled	108	Arsenic and manganese and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluroanthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene
RB-18	IR-30	30-1	300107	Action	TCRA Delineation	Excavated and backfilled	195	Cadmium, chromium, hexavalent chromium, copper, lead, nickel, and zinc
RB-18	IR-30	30-1	300108	Action	TCRA Delineation	Excavated and backfilled	102	Combined TPH
RB-18	IR-30	30-1	300109	Action	TCRA Delineation	Site delineated; excavation not required	Not excavated	Chromium and hexavalent chromium
RB-18	IR-30	30-1	300110	Action	TCRA Delineation	Excavated and backfilled	30	Lead and manganese and combined TPH
RB-18	IR-30	30-1	300111	Action	TCRA Delineation	Excavated and backfilled	24	Arsenic, chromium, hexavalent chromium, copper, manganese, and zinc and Aroclor-1260
RB-18	IR-30	30-1	300112	Action	TCRA Delineation	Excavated and backfilled	115	Copper, lead, molybdenum, nickel, and zinc
RB-18	IR-30	30-1	300113	Action	TCRA Delineation	Excavated and backfilled	see 300116	Arsenic, chromium, hexavalent chromium, copper, molybdenum, nickel, and zinc
RB-18	IR-30	30-1	300114	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Benzene

TABLE 2-8: TCRA SITE HISTORY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block[a]	IR Site Number	Remediation or De Minimis Area[b]	Remediation Subarea[c]	RMR Recommendation[d]	Excavation Type	Pre-FS Status[e]	Volume Excavated (cubic yard)	Excavation COPCs[f]
RB-18	IR-30	30-1	300115	Action	TCRA Delineation	Excavated and backfilled	42	Copper, chromium, and hexavalent chromium and benzene
RB-18	IR-30	30-1	300116	Action	TCRA Delineation	300113, 300116 and 300118 combined and partially excavated; remainder to be addressed in Revised FS Report	1278	Arsenic, chromium, hexavalent chromium, cobalt, copper, lead, magnesium, molybdenum, nickel, and zinc; aldrin, dieldrin, and heptachlor epoxide; benzene; and combined TPH
RB-18	IR-30	30-1	300117	Action	TCRA Delineation	Excavated and backfilled	32	Manganese and zinc
RB-18	IR-30	30-1	300118	Action	TCRA Delineation	Excavated and backfilled	see 300116	Copper, lead, and nickel and benzene
RB-18	IR-30	30-1	300119	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Benzene
RB-18	IR-30	NA	EE-10	Completed prior to RMR	Exploratory Excavation	Excavated and backfilled	14	Thallium and TPH-diesel and TPH-motor oil
RB-20A	IR-28	28-6	280601	Action	TCRA Delineation	Site delineated (280601, 280602, and 280604 merged); to be addressed in Revised FS Report	Not excavated	Chromium, hexavalent chromium, copper, manganese, and zinc and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene
RB-20A	IR-28	28-6	280602	Action	TCRA Delineation	Site delineated (280601, 280602, and 280604 merged); to be addressed in Revised FS Report	Not excavated	Aroclor-1260
RB-20A	IR-28	28-6	280603	Action	TCRA Delineation	Site delineated; excavation not required	Not excavated	Manganese
RB-20A	IR-28	28-6	280604	Action	TCRA Delineation	Site delineated (280601, 280602, and 280604 merged); to be addressed in Revised FS Report	Not excavated	Copper and zinc
RB-20A	IR-28	28-6	280605	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Zinc
RB-20A	IR-28	DM 8331	DM 8331	Not identified	Data Gaps Sampling[g]	Site delineated, to be addressed in Revised FS Report	Not excavated	Copper and manganese
RB-20A	IR-28	DM 8334	DM 8334	Action	Data Gaps Sampling[g]	Excavated and backfilled	28	Copper and zinc and Aroclor-1260
RB-20A	IR-28	DM 8435	DM 8435	Not identified	Data Gaps Sampling[g]	Site delineated; excavation not required	Not excavated	Manganese
RB-20A	IR-28	DM 8632	DM 8632	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-20B	IR-28	28-2	280202	Action	Treatability Study Area/Delineation[f]	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic
RB-20B	IR-28	28-2	280203	Action	Treatability Study Area/Delineation[f]	Site delineated; to be addressed in Revised FS Report	Not excavated	Aroclor-1260 and combined TPH
RB-20B	IR-28	28-2	280204	Action	Treatability Study Area/Delineation[f]	Transferred to TPH Program	Not excavated	Combined TPH
RB-22	IR-28	28-11	281104	Action	TCRA Delineation	Excavated and backfilled	22	Arsenic
RB-22	IR-28	DM 9420	DM 9420A	Action	Data Gaps Sampling[g]	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic and lead; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene; and combined TPH
RB-22	IR-28	DM 9420B	DM 9420B	Action	Data Gaps Sampling[g]	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic and lead; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene; and combined TPH
RB-22	IR-28	DM 9420C	DM 9420C	Action	Data Gaps Sampling[g]	Excavated and backfilled	80	Benzo(a)pyrene
RB-22	NA	S-214	S-214	Not identified	Not identified	Sample collected near Building 205, by former UST S-214	Not excavated	Organic Lead
RB-23	IR-29	29-1	290103	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese

Redevelopment Block[a]	IR Site Number	Remediation or De Minimis Area[b]	Remediation Subarea[c]	RMR Recommendation[d]	Excavation Type	Pre-FS Status[e]	Volume Excavated (cubic yard)	Excavation COPCs[f]
RB-23	IR-29	29-1	290104	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, cadmium, copper, organic lead, manganese, mercury, thallium, and zinc; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene; and combined TPH
RB-23	IR-29	29-1	290105	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, cadmium, copper, organic lead, manganese, thallium, and zinc and benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene
RB-23	IR-29	29-1	290106	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, copper, lead, organic lead, manganese, thallium, and zinc; Aroclor-1260; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene; and combined TPH
RB-23	IR-29	29-1	290107	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Manganese and mercury
RB-23	IR-29	29-1	290108	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic and copper; Aroclor-1260; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene
RB-23	IR-29	29-1	290109	Action	TCRA Delineation	Partially excavated; remainder to be addressed in Revised FS Report (290109 and 290601 merged).	825	Arsenic, cadmium, copper, lead, organic lead, manganese, thallium, and zinc; Aroclor-1254 and Aroclor-1260; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene
RB-23	IR-29	29-1	290110	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Copper, lead, and zinc; Aroclor-1254 and Aroclor-1260; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene
RB-23	IR-29	29-1	290111	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Copper and lead
RB-23	IR-29	29-1	290112	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, cadmium, and copper; Aroclor-1260; and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and indeno(1,2,3-cd)pyrene
RB-23	IR-29	29-2	290201	Combined with 29-4	TCRA Delineation	Excavated and backfilled	49	Arsenic, copper, and manganese
RB-23	IR-29	29-3	290301	Action	TCRA Delineation	Excavated and backfilled (290301 and 290302 merged)	40	Aroclor-1260
RB-23	IR-29	29-1	290302	Action	TCRA Delineation	Excavated and backfilled (290301 and 290302 merged)	See above 290301	Aroclor-1254 and Aroclor-1260
RB-23	IR-29	29-4 (includes 29-2)	290401	Action	TCRA Delineation	Manganese-only site	Not excavated	Manganese
RB-23	IR-29	29-1	290402	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, cadmium, copper, manganese, and vanadium
RB-23	IR-29	29-4	290403	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Cadmium, copper, manganese, and zinc; Aroclor-1260; and benzo(a)anthracene, benzo(a)pyrene, and benzo(k)fluoranthene
RB-23	IR-29	DM 8637	DM 8637	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	28-3	280301	Action	TCRA Delineation	Partially excavated (280301 and 280302 merged); remainder to be addressed in Revised FS Report	541	Arsenic, copper, manganese, mercury, and thallium and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene
RB-24	IR-28	28-3	280302	Action	TCRA Delineation	Partially excavated (280301 and 280302 merged); remainder to be addressed in Revised FS Report	See 280301	Arsenic, copper, and manganese and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene
RB-24	IR-28	28-7	280701	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Manganese and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene

TABLE 2-8: TCRA SITE HISTORY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block[a]	IR Site Number	Remediation or De Minimis Area[b]	Remediation Subarea[c]	RMR Recommendation[d]	Excavation Type	Pre-FS Status[e]	Volume Excavated (cubic yard)	Excavation COPCs[f]
RB-24	IR-28	28-8	280801	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, copper, manganese, thallium, and zinc
RB-24	IR-28	28-10	281001	Action	TCRA Delineation	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	28-10	281002	Action	TCRA Delineation	Excavated and backfilled	4	Manganese and benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene
RB-24	IR-28	28-13	281301	Action	TCRA Delineation	Site delineated; excavation not required	Not excavated	Manganese
RB-24	IR-28	DM 8834	DM 8834	Not identified	Data Gaps Sampling[g]	Site delineated; to be addressed in Revised FS Report	Not excavated	Copper and manganese
RB-24	IR-28	DM 8835	DM 8835	Not identified	Data Gaps Sampling[g]	Site delineated; to be addressed in Revised FS Report	Not excavated	Manganese and mercury
RB-24	IR-28	DM 8934	DM 8934	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	DM 8935	DM 8935A	Not identified	Data Gaps Sampling[g]	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, copper, manganese, and mercury
RB-24	IR-28	DM 8935B	DM 8935B	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	DM 9132	DM 9132	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	DM 9134	DM 9134	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	DM 9233	DM 9233	Not identified	Data Gaps Sampling[g]	Excavated and backfilled	6	Zinc
RB-24	IR-28	DM 9330 (formerly DM 51SS15)	DM 9330	Action	TCRA Delineation	Excavated and backfilled	20	Manganese and zinc and Aroclor-1260
RB-24	IR-28	DM 9331	DM 9331	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	DM 9334	DM 9334	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	DM 9336	DM 9336A	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, cadmium, copper, lead, manganese, mercury, and zinc
RB-24	IR-28	DM 9336B	DM 9336B	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, copper, and manganese
RB-24	IR-28	DM 9434	DM 9434	Action	TCRA Delineation	Excavated and backfilled	45	Arsenic, manganese, and thallium
RB-24	IR-28	DM 9435	DM 9435	Not identified	Data Gaps Sampling[g]	Site delineated; excavation not required	Not excavated	Arsenic, chromium, hexavalent chromium, copper, lead, organic lead, manganese, mercury, and zinc; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and indeno(1,2,3-cd)pyrene
Retur	IR-28	DM 9532	DM 9532A	Action	TCRA Delineation	Excavated and backfilled; combined with DM 9832B	81	Antimony, chromium, hexavalent chromium, copper, and zinc and Aroclor-1260
RB-24	IR-28	DM 9532B	DM 9532B	Action	TCRA Delineation	Excavated and backfilled; combined with DM 9832A	See above	Copper, manganese, and thallium and Aroclor-1260
RB-24	IR-28	DM 9532C	DM 9532C	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	DM 9532D	DM 9532D	Action	TCRA Delineation	Excavated and backfilled	25	Benzo(a)pyrene and benzo(b)fluoranthene
RB-24	IR-28	DM 9628	DM 9628	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	DM 9729	DM 9729	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-24	IR-28	NA	EE-09	Completed prior to RMR	Exploratory Excavation	Excavated and backfilled	309	Arsenic, chromium, and mercury; SVOCs; and TPH-motor oil
RB-24	IR-29	29-1	290101	Action	TCRA Delineation	Manganese-only site	Not excavated	Manganese
RB-24	IR-29	29-1	290102	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic, copper, manganese, thallium, and zinc
RB-25	IR-28	28-18	281801	Action	TCRA Delineation	Excavated and backfilled	34	Arsenic and lead
RB-25	IR-28	28-19	281901	Action	TCRA Delineation	Excavated and backfilled	32	Arsenic and lead and N-nitroso-di-n-propylamine

TABLE 2-8: TCRA SITE HISTORY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block[a]	IR Site Number	Remediation or De Minimis Area[b]	Remediation Subarea[c]	RMR Recommendation[d]	Excavation Type	Pre-FS Status[e]	Volume Excavated (cubic yard)	Excavation COPCs[f]
RB-25	IR-28	DM 9819	DM 9819	Action	Treatability Study Area/Delineation[f]	Site delineated; excavation not required	Not excavated	Hexavalent chromium and chromium
RB-26	IR-28	28-21	282101	Action	TCRA Delineation	Excavated and backfilled	70	Arsenic, chromium, hexavalent chromium, and manganese
RB-26	IR-28	DM 9441	DM 9441	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-26	IR-29	29-6	290601	Action	TCRA Delineation	Partially excavated; remainder to be addressed in Revised FS Report (290109 and 290601 merged). Excavation performed adjacent to former UST S-209	see 290109	Cadmium, copper, lead, organic lead, thallium, and zinc; Aroclor-1254 and Aroclor-1260; 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene
RB-26	IR-29	29-7	290701	Action	TCRA Delineation	Excavated and backfilled	253	Cadmium, chromium, hexavalent chromium, copper, lead, mercury, and zinc
RB-26	IR-29	29-7	290702	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
RB-26	IR-29	Fuel line	BH5	Not identified	Not identified	Excavated and backfilled	140	2-Methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene and combined TPH
RB-26	IR-29	DM 9143	DM 9143	Not identified	Data Gaps Sampling[g]	Excavated and backfilled	485	Copper, organic lead, and zinc; Aroclor-1260; and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene
RB-26	IR-29	DM 9343	DM 9343	Not identified	Data Gaps Sampling[g]	Manganese-only site	Not excavated	Manganese
CMI-1	IR-57	57-4	570401	Not identified	Not identified	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic and benzo(a)pyrene, benzo(a)anthracene, and benzo(b)fluoranthene
CMI-1	IR-57	NA	EE-06	Completed prior to RMR	Exploratory Excavation	Excavated and backfilled	19	Arsenic, TPH
CMI-1	IR-57	NA	EE-07	Completed prior to RMR	Exploratory Excavation	Excavated and backfilled	391	TPH
COS-1	IR-64	64-1	640101	Action	TCRA Delineation	Excavated and backfilled	32	Arsenic
COS-2	IR-28	28-1	280101	Action	TCRA Delineation	Excavated and backfilled (280101, 280102, and 280105 merged). Excavated areas of former USTs HPA -10, HPA -16, HPA -17	3,330	Arsenic; benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene; and combined TPH
COS-2	IR-28	28-1	280102	Action	TCRA Delineation	Excavated and backfilled (280101, 280102, and 280105 merged)	See 280101	Arsenic and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene
COS-2	IR-28	28-1	280103	Action	TCRA Delineation	Excavated and backfilled	59	Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene
COS-2	IR-28	28-1	280104	Action	TCRA Delineation	Excavated and backfilled	451	Arsenic and lead; 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, and naphthalene; and combined TPH
COS-2	IR-28	28-1	280105	Action	TCRA Delineation	Excavated and backfilled (280101, 280102, and 280105 merged)	See 280101	Arsenic; benzo(a)anthracene, benzo(a)pyrene, benzo(b)-fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene; and combined TPH
COS-2	IR-28	28-10	281003	Action	TCRA Delineation	Transferred to TPH Program	Not excavated	Combined TPH
COS-2	IR-28	28-11	281101	Action	TCRA Delineation	Site delineated; excavation not required	Not excavated	Hexavalent chromium and chromium
COS-2	IR-28	28-11	281103	Action	TCRA Delineation	Partially excavated. Excavation completed outside Building 231 at closed-in-place UST HPA-12.	73	Arsenic; benzo(a)anthracene, benzo(a)pyrene, benzo(b)-fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene; and combined TPH

TABLE 2-8: TCRA SITE HISTORY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block[a]	IR Site Number	Remediation or De Minimis Area[b]	Remediation Subarea[c]	RMR Recommendation[d]	Excavation Type	Pre-FS Status[e]	Volume Excavated (cubic yard)	Excavation COPCs[f]
COS-2	IR-28	28-11	281105	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Arsenic and benzo(a)pyrene
COS-3	IR-28	28-11	281102	Action	TCRA Delineation	Site delineated; to be addressed in Revised FS Report	Not excavated	Benzo(a)pyrene
COS-3	IR-28	28-17	281701	Action	Data Gaps Sampling[g]	Site delineated; excavation not required	Not excavated	Aroclor-1260
COS-3	IR-28	Fuel line	BH3	Not identified	Not identified	Site delineated; to be addressed in Revised FS Report	Not excavated	Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene
COS-3	IR-28	NA	EE-08	Completed prior to RMR	Exploratory Excavation	Excavated and backfilled	93	Arsenic and manganese and TPH-diesel and TPH-motor oil

Notes:

a The reuse plan designation was established by the San Francisco Redevelopment Agency (1997). The redevelopment blocks are derived from the redevelopment plan.

b The remediation areas and several of the de minimis areas were developed during the 1998 Draft Final Parcel C FS Report (Tetra Tech EM Inc. and Levine-Fricke-Recon, Inc. 1998).

c The remediation subareas, subdivisions of the remediation areas, and the remainder of the de minimis areas were developed in the Sampling and Analysis Plan (Tetra Tech EM Inc. and Washington Group International 2001).

d The RMR consisted of a series of working meetings of the BCT beginning in 1999 through July 2000 (Tetra Tech EM Inc. and Washington Group International 2002). On July 21, 2000, with the intention of providing final documentation of the RMR process, the Navy summarized the BCT recommendations on the Draft RMR Technical Memorandum in a letter to the BCT. The Navy received concurrence on the recommendation summary

e TCRA results/current status lists the pre-FS status of each remediation subarea in the following categories (Tetra Tech EM Inc. and Washington Group International 2002):
- Excavated and backfilled: The remediation subarea has been delineated, excavated, and backfilled in accordance with the TCRA FSAP.
- Site delineated; excavation not required: The remediation subarea has been delineated and determined to not require excavation.
- Site delineated; to be addressed in Revised FS Report: The remediation subarea has been delineated and will be addressed in this Revised FS Report.
- Partially excavated; remainder to be addressed in Revised FS Report: The remediation subarea was delineated, partially excavated, and the remainder of the subarea will be addressed in the Revised FS Report.
- Manganese-only site: These areas had manganese as the only COC. Most were not delineated.
-Transferred to TPH Program: The remediation subarea is a TPH-only area and is being addressed under the TPH Program.

f These COPCs were developed based on the goals developed for the TCRA.

g Data gaps sampling : These areas sampled to address data gaps. Removal actions were not planned here.

BCT	Base Realignment and Closure Cleanup Team	FSAP	Field Sampling and Analysis Plan
CMI	Parcel C maritime/industrial	IR	Installation Restoration
COC	Chemical of concern	NA	Not available
COS	Parcel C open space	RB	Redevelopmnent block
COPC	Chemical of potential concern	RMR	Risk Management Review
DM	De minimis	SVOC	Semivolatile organic compound
EPA	U.S. Environmental Protection Agency	TCRA	Time-critical removal action
EE	Exploratory excavation	TPH	Total petroleum hydrocarbons
FS	Feasibility Study	UST	Underground storage tank

References:

San Francisco Redevelopment Agency. 1997. "Hunters Point Shipyard Redevelopment Plan." City and County of San Francisco. July 14.
Tetra Tech EM Inc and Levine Fricke. 1998. "Parcel C Feasibility Study, Draft Final Report, Hunters Point Shipyard, San Francisco, California." July 15.
Tetra Tech EM Inc and Washington Group International. 2001. "Final Sampling and Analysis Plan, Parcel C Soil Site Delineation." January 18.
Tetra Tech EM Inc. and Washington Group International. 2002. "Final Parcel C Time-Critical Removal Action." July 12.

TABLE 2-9: SUMMARY OF AQUIFER CHARACTERISTICS AT PARCEL C

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Results from Pumping Tests

RU	Horizontal Hydraulic Conductivity [a]	Transmissivity	Storage Coefficient	Pumping Rates (gpm)	Test Duration (hours)
RU-C1[b]	3.6 ft/day (0.0013 cm/sec)	58 ft^2/day (0.5 cm^2/sec)	0.38	3.8	48
RU-C2[c]	1.9 ft/day (0.000 7 cm/sec)	49 ft^2/day (0.5 cm^2/sec)	0.12	1	34
RU-C5[d]	0.1 ft/day (0.000035 cm/sec)	2.5 ft^2/day (0.027 cm^2/sec)	0.008	0.26	48

Results from Slug Tests

Aquifer	Site	Well	Date Tested[e]	Transmissivity[f] (ft^2/day)	Hydraulic Conductivity[f] (ft/day)
A-Aquifer	IR-28	IR28MW122A	6/27/94	260	27
		IR28MW123A	6/30/94	4600	390
		IR28MW123A	7/18/95	1370	105
		IR28MW124A	6/27/94	650	39
		IR28MW125A	6/27/94	220	22
		IR28MW126A	6/27/94	240	16
		IR28MW127A	6/27/94	730	47
		IR28MW128A	6/28/94	390	29
		IR28MW129A	7/18/95	NA	NA
		IR28MW136A	6/28/94	290	31
		IR28MW149A	6/28/94	760	38
		IR28MW150A	6/27/94	460	36
		IR28MW151A	6/28/94	57	3.9
		IR28MW151A	7/20/95	8.5	0.57
		IR28MW155A	6/28/94	410	21
		IR28MW169A	6/29/94	820	46
		IR28MW170A	12/1/94	460	26
		IR28MW200A	6/29/94	340	43
		IR28MW217A	6/29/94	790	56
		IR28MW217A	7/19/95	1.3	0.09
		IR28MW268A	11/28/95	95	6.1
		IR28MW269A	11/29/95	NA	NA
		IR28MW270A	11/29/95	NA	NA

TABLE 2-9: SUMMARY OF AQUIFER CHARACTERISTICS AT PARCEL C (CONTINUED)
Revised Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Results from Slug Tests

Aquifer	Site	Well	Date Tested[e]	Transmissivity[f] (ft^2/day)	Hydraulic Conductivity[f] (ft/day)
A-Aquifer (cont.)	IR-28 (cont.)	IR28MW271A	11/29/95	497	31
		IR28MW272A	11/28/95	11.6	2.1
		IR28MW286A	11/28/95	28	6.9
		IR28MW287A	11/28/95	1.8	0.52
		IR28MW290A	3/7/96	5.1	0.28
		IR28MW293A	11/28/95	NA	NA
		IR28MW294A	11/28/95	NA	NA
		IR28MW295A	11/28/95	NA	NA
		IR28MW297A	11/28/95	NA	NA
		IR28MW298A	3/7/96	NA	NA
		IR28MW308A	5/7/96	229	20
		IR28MW311A	5/7/96	399	26.6
		PA28MW50A	6/28/94	280	22
		PA28MW51A	6/28/94	230	11
		PA28MW52A	6/28/94	500	34
		PA28P02A	6/29/94	12000	560
		PA28P03A	6/28/94	2500	190
		PA28P04A	6/29/94	410	35
	IR-29	IR29MW84A	11/29/95	79	26
	IR-50	PA50MW03A	6/29/94	19000	670
		PA50MW03A	7/18/95	1801	257
		PA50MW04A	6/29/94	150	29
		PA50MW04A	7/17/95	18	2.6
	IR-57	IR57MW30A	11/29/95	NA	NA
	IR-58	IR58MW26A	6/30/94	1	43
		IR58MW31A	7/13/94	0.046	0.046
	IR-64	IR64MW05A	11/29/95	0.044	0.0095
B-Aquifer	IR-28	IR28MW173B	12/1/94	7.1	0.64
		IR28MW173B	7/18/95	1.7	0.25
		IR28MW299B	3/18/96	11	0.72
		IR28MW309B	5/8/96	54	1.1
		IR28MW314B	5/7/96	1.8	0.093
	IR-58	IR58MW32B	5/8/96	18	0.89
		IR58MW32B	5/8/96	16	0.91

TABLE 2-9: SUMMARY OF AQUIFER CHARACTERISTICS AT PARCEL C (CONTINUED)
Revised Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Results from Slug Tests

Aquifer	Site	Well	Date Tested[e]	Transmissivity[f] (ft^2/day)	Hydraulic Conductivity[f] (ft/day)
F-BWZ	IR-28	IR28MW140F	11/30/94	0.039	0.0018
		IR28MW140F	8/9/95	0.47	0.012
		IR28MW172F	11/30/94	13	0.95
		IR28MW188F	6/30/94	95	6.8
		IR28MW189F	6/30/94	0.65	0.063
		IR28MW189F	7/19/95	0.18	0.015
		IR28MW190F	7/1/94	1.2	0.16
		IR28MW201F	10/13/95	1.9	0.12
		IR28MW211F	7/20/95	400	40
		IR28MW211F	12/1/94	0.052	0.052
		IR28MW255F	11/30/94	10	0.048
		IR28MW273F	3/7/96	1.3	0.093
		IR28MW275F	3/7/96	1.3	0.16
		IR28MW300F	3/18/96	1.1	0.069
		IR28MW310F	5/8/96	3.1	0.1
		IR28MW312F	5/8/96	4.2	0.33
		IR28MW313F	5/7/96	1.3	0.065
		IR29MW56F	11/30/94	4.4	0.55
		IR29MW56F	7/19/95	0.11	0.013
		IR29MW58F	11/30/94	3.6	0.32
	IR-29	IR29MW59F	11/30/94	47	3.2
		IR29MW72F	12/1/94	750	3.2
		IR29MW85F	5/8/96	0.03	0.002
	IR-50	IR50MW13F	11/30/94	140	13
	IR-58	IR58MW24F	6/30/94	0.24	0.019
		IR58MW25F	6/30/94	1000	0.018

Notes:

a From constant distance, pumping tests performed between July 3, 2000, and August 5, 2002.

b Pumping tests for RU-C1 conducted at wells IR28IW902A, IR28MW921A, IR28MW151A, IR28MW919A, IR281W901A, IR28MW173B, IR28MW353A, and IR28MW354B.

c Pumping tests for RU-C2 conducted at wells IR58MW35A, IR58MW33B, IR58MW31A, IR28MW914A, IR28MW912A, IR28MW910A, IR58MW34A, and IR58MW31F.

d Pumping tests for RU-C5 conducted at wells IR25MW901B, IR25MW902B, IR25MW900B, IR25MW15A1, IR25MW15A2, IR25MW51A, IR06MW44A, and IR25MW15F.

e All tests done in 1994 were performed by HLA. All tests done in 1995 and 1996 were performed by Levine-Fricke.

f All transmissivity and conductivity values were determined using the Bouwer and Rice Method.

cm/sec	Centimeters per second	ft^2/day	Square feet per day
cm^2/sec	Square centimeters per second	gpm	Gallons per minute
ft/day	Feet per day	RU	Remedial Unit

TABLE 2-10: PARCEL-WIDE SUMMARY STATISTICS OF SOIL ANALYTICAL DATA
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HPAL	Detects Greater than EPA Residential PRG 2004	Detects Greater than EPA Industrial PRG 2004	Detects Greater than Parcel C PQL	Detects Greater than Parcel C Residential Soil PRG 06	Detects Greater than Parcel C Industrial Soil PRG 06	Detects Greater than Parcel C Recreational RBC 06	HPAL	EPA Residential PRG 2004	EPA Industrial PRG 2004[1]	Parcel C PQL	Parcel C Residential Soil PRG 06	Parcel C Industrial Soil PRG 06	Parcel C Recreational RBC 06
CHROM	Chromium VI	mg/kg	348	15	4.3	0.013	2.4	0.075	9.1	0.92	0.16	2.2	NA	0.00	0.00	NA	0.00	0.00	NA	NA	30.096489	64.045325	NA	17	37	NA
CYAN	Cyanide	mg/kg	26	4	15.4	0.04	0.58	0.04	0.16	0.075	0.05	0.050	NA	0.00	0.00	NA	0.00	0.00	NA	NA	1222	12313	NA	1,200	18,000	NA
HYDRAZINE	Hydrazine	mg/kg	2	0	0.0	0.3	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.16	0.57	NA	NA	NA	NA
METAL	Aluminum	mg/kg	713	711	99.7	1.3	4,260	147	53,600	16,194	14,100	10867	NA	0.00	0.00	NA	0.00	0.00	NA	NA	76142	100000	NA	73,000	1,700,000	NA
METAL	Antimony	mg/kg	701	354	50.5	0.1	25.9	0.23	30.1	4.68	2.95	4.4	0.14	0.00	0.00	0.99	0.10	0.00	NA	9.05	31.285712	408.799666	0.5	10	820	NA
METAL	Arsenic	mg/kg	1,821	1,289	70.8	0.1	28	0.178	245	8.43	4.1	16	0.16	1.00	0.88	1.00	1.00	0.99	1.00	11.1	0.39	1.59	0.2	0.038	0.43	0.37
METAL	Barium	mg/kg	706	702	99.4	0.02	51	0.69	1,860	188	125	227	0.13	0.00	0.00	NA	0.00	0.00	NA	314.4	5375	66577	NA	7500	290,000	NA
METAL	Beryllium	mg/kg	745	227	30.5	0.007	1.3	0.03	1.2	0.39	0.41	0.20	0.04	0.00	0.00	NA	0.00	0.00	NA	0.71	154	1941	NA	140	2,200	NA
METAL	Cadmium	mg/kg	1,166	413	35.4	0.01	22	0.04	31.5	1.63	0.98	2.2	0.14	0.00	0.00	1.00	0.11	0.00	NA	3.14	37.03	451.4	0.04	3.5	980	NA
METAL	Calcium	mg/kg	706	684	96.9	1.1	20,300	85.5	188,000	11,814	8,080	14800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METAL	Chromium	mg/kg	947	946	99.9	0.045	10	2.1	3,000	308	167	353	0.09	0.42	0.22	NA	0.00	0.00	NA	15.02-2,724.44	211	448	NA	90,000	3,100,000	NA
METAL	Cobalt	mg/kg	745	744	99.9	0.056	13	2.8	244	43	34.35	32	0.09	0.00	0.00	NA	0.00	0.00	NA	4.6-229.33	903	1921	NA	900	1,900	NA
METAL	Copper	mg/kg	1,749	1,730	98.9	0.04	53	0.93	7,600	112	55.05	340	0.18	0.00	0.00	1.00	0.13	0.00	NA	124.3	3129	40877	0.1	160	76,000	NA
METAL	Iron	mg/kg	706	706	100.0	0.47	50	121	125,000	35,120	34,350	12484	0.04	0.85	0.00	1.00	0.88	0.00	NA	58000	23463	100000	0.6	22,000	610,000	NA
METAL	Lead	mg/kg	1,468	1,249	85.1	0.1	13	0.15	2,610	53	8.1	178	0.46	0.07	0.01	0.98	0.07	0.01	0.07	8.99	150	800	0.6	155	800	155
METAL	Magnesium	mg/kg	913	910	99.7	0.78	19,500	245	464,000	61,217	28,950	68669	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METAL	Manganese	mg/kg	1,865	1,865	100.0	0.018	180	2.1	55,300	2,234	946	4009	0.34	0.28	0.01	1.00	0.57	0.00	NA	1431.2	1762	19458	0.05	840	32,000	NA
METAL	Mercury	mg/kg	922	586	63.6	0.005	10.9	0.025	124	1.99	0.19	9.4	0.10	0.02	0.00	1.00	0.11	0.00	NA	2.28	23.464	306.5998	0.02	1.6	610	NA
METAL	Molybdenum	mg/kg	712	89	12.5	0.08	5.41	0.11	79.6	2.83	1.2	9.0	0.17	0.00	0.00	NA	0.01	0.00	NA	2.68	391	5110	NA	76	10,000	NA
METAL	Nickel	mg/kg	745	743	99.7	0.078	54.8	3.1	5,080	599	275	704	0.01	0.11	0.00	1.00	0.48	0.00	NA	8.3-15,145.25	1564	20439	1	300	21,000	NA
METAL	Potassium	mg/kg	706	555	78.6	2.2	1,300	13	4260	940	844	600	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METAL	Selenium	mg/kg	669	68	10.2	0.11	8.3	0.29	7.3	1.52	1.15	1.2	0.26	0.00	0.00	NA	0.00	0.00	NA	1.95	391	5110	NA	140	10,000	NA
METAL	Silver	mg/kg	704	28	4.0	0.043	3.7	0.13	110	4.64	0.645	20	0.14	0.00	0.00	NA	0.04	0.00	NA	1.43	391	5110	NA	50	10,000	NA
METAL	Sodium	mg/kg	706	396	56.1	3.1	4,000	20.3	9,330	849	468.5	1276	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
METAL	Thallium	mg/kg	1,148	153	13.3	0.12	155	0.3	60.9	4.63	1.7	7.4	0.82	0.25	0.00	0.46	0.25	0.00	NA	0.81	5.162143	67.451991	2	5	130	NA
METAL	Vanadium	mg/kg	739	738	99.9	0.05	13	0.63	636	62	57.25	40	0.06	0.27	0.00	1.00	0.43	0.00	NA	117.2	78.2143	1021.998	0.1	65	2,000	NA
METAL	Zinc	mg/kg	1,347	1,323	98.2	0.06	210	8.8	36,000	161	62.5	1038	0.21	0.00	0.00	1.00	0.06	0.00	NA	109.9	23463	100000	0.09	370	610,000	NA
ORGPB	Organic Lead	mg/kg	312	25	8.0	0.062	2.3	0.31	62	4.61	0.86	12	NA	NA	NA	0.84	1.00	1.00	NA	NA	NA	NA	0.6	0.0052	0.088	NA
PEST	4,4'-DDD	mg/kg	630	20	3.2	0.003	0.38	0.0001	0.034	0.006	0.003	0.0081	NA	0.00	0.00	NA	0.00	0.00	NA	NA	2.44	9.95	NA	2.1	17	NA
PEST	4,4'-DDE	mg/kg	629	21	3.3	0.003	0.38	0.0001	1.7	0.090	0.004	0.36	NA	0.00	0.00	NA	0.05	0.00	NA	NA	1.72	7.02	NA	1.6	12	NA
PEST	4,4'-DDT	mg/kg	631	27	4.3	0.003	0.38	0.0005	0.041	0.010	0.004	0.011	NA	0.00	0.00	NA	0.00	0.00	NA	NA	1.72	7.02	NA	1.2	12	NA
PEST	Aldrin	mg/kg	629	10	1.6	0.0017	0.19	0.0007	0.011	0.005	0.0035	0.0037	NA	0.00	0.00	NA	0.00	0.00	NA	NA	0.03	0.10	NA	0.024	0.15	NA
PEST	alpha-BHC	mg/kg	629	0	0.0	0.0017	0.19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.09	0.36	NA	0.0019	0.59	NA
PEST	alpha-CHLORDANE	mg/kg	629	19	3.0	0.0017	1.7	0.0001	0.45	0.028	0.002	0.100	NA	0.00	0.00	NA	0.05	0.00	NA	NA	1.62	6.47	NA	0.3	2.9	NA
PEST	beta-BHC	mg/kg	629	4	0.6	0.0017	0.19	0.00006	0.002	0.002	0.002	0.00084	NA	0.00	0.00	NA	0.00	0.00	NA	NA	0.32	1.26	NA	0.0066	2.1	NA
PEST	delta-BHC	mg/kg	629	4	0.6	0.0017	0.19	0.0001	0.017	0.006	0.0026	0.0069	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	11	270	NA
PEST	Dieldrin	mg/kg	630	7	1.1	0.003	0.38	0.002	0.045	0.009	0.002	0.015	NA	0.14	0.00	0.14	1.00	0.00	NA	NA	0.03	0.11	0.004	0.00066	0.15	NA
PEST	Endosulfan I	mg/kg	629	17	2.7	0.0017	0.19	0.001	0.028	0.004	0.002	0.0062	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	15	5,300	NA
PEST	Endosulfan II	mg/kg	629	1	0.2	0.003	0.38	0.002	0.002	0.002	0.002	NA	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	15	5,300	NA
PEST	Endosulfan sulfate	mg/kg	630	5	0.8	0.002	0.38	0.0003	0.005	0.002	0.002	0.0016	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	16	5,300	NA
PEST	Endrin	mg/kg	629	8	1.3	0.003	0.38	0.001	0.032	0.008	0.004	0.0097	NA	0.00	0.00	NA	0.00	0.00	NA	NA	18.33	184.68	NA	17	260	NA
PEST	Endrin aldehyde	mg/kg	590	5	0.9	0.003	0.38	0.002	0.014	0.005	0.003	0.0046	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	17	260	NA
PEST	Endrin ketone	mg/kg	617	5	0.8	0.003	0.38	0.0004	0.018	0.005	0.002	0.0066	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	17	260	NA
PEST	gamma-BHC (Lindane)	mg/kg	629	2	0.3	0.0017	0.19	0.005	0.0089	0.007	0.00695	0.0020	NA	0.00	0.00	1.00	1.00	0.00	NA	NA	0.44	1.74	0.003	0.0026	2.9	NA
PEST	gamma-Chlordane	mg/kg	629	13	2.1	0.0017	1.7	0.0002	0.035	0.005	0.003	0.0087	NA	0.00	0.00	NA	0.00	0.00	NA	NA	1.62	6.47	NA	0.3	2.9	NA
PEST	Heptachlor	mg/kg	629	4	0.6	0.0017	0.19	0.002	0.004	0.004	0.004	0.00087	NA	0.00	0.00	NA	0.00	0.00	NA	NA	0.11	0.38	NA	0.083	0.55	NA
PEST	Heptachlor epoxide	mg/kg	618	8	1.3	0.0003	0.19	0.0007	0.03	0.006	0.0025	0.0092	NA	0.00	0.00	0.50	1.00	0.00	NA	NA	0.05	0.19	0.002	0.00054	0.27	NA
PEST	Heptachlor epoxide a	mg/kg	12	0	0.0	0.0018	0.032	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
PEST	Heptachlor epoxide b	mg/kg	12	1	8.3	0.0018	0.032	0.0035	0.0035	0.004	0.0035	NA	NA	NA	NA	1.00	1.00	NA	NA	NA	NA	NA	0.003	0.00054	NA	NA
PEST	Methoxychlor	mg/kg	629	3	0.5	0.017	1.9	0.0088	0.014	0.011	0.011	0.0021	NA	0.00	0.00	NA	0.00	0.00	NA	NA	306	3078	NA	290	4,400	NA
PEST	Toxaphene	mg/kg	629	0	0.0	0.043	19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.44	1.57	NA	NA	NA	NA
PCB	Aroclor-1016	mg/kg	1,394	1	0.1	0.012	9.4	0.013	0.013	0.013	0.013	NA	NA	0.00	0.00	NA	0.00	0.00	NA	NA	3.93	21.25	NA	3.5	29	NA
PCB	Aroclor-1221	mg/kg	1,394	0	0.0	0.012	19	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.22	0.74	NA	NA	NA	NA
PCB	Aroclor-1232	mg/kg	1,394	0	0.0	0.012	9.4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.22	0.74	NA	NA	NA	NA
PCB	Aroclor-1242	mg/kg	1,394	1	0.1	0.012	9.4	0.059	0.059	0.059	0.059	NA	NA	0.00	0.00	NA	0.00	0.00	NA	NA	0.22	0.74	NA	0.18	1	NA
PCB	Aroclor-1248	mg/kg	1,394	3	0.2	0.012	9.4	0.04	0.11	0.087	0.11	0.033	NA	0.00	0.00	NA	0.00	0.00	NA	NA	0.22	0.74	NA	0.2	1	NA
PCB	Aroclor-1254	mg/kg	1,408	22	1.6	0.005	9.4	0.023	0.87	0.19	0.094	0.21	NA	0.32	0.05	1.00	0.50	0.00	NA	NA	0.22	0.74	0.01	0.093	1	NA
PCB	Aroclor-1260	mg/kg	1,545	291	18.8	0.004	77	0.006	270	4.18	0.078	26	NA	0.30	0.14	0.96	0.30	0.12	NA	NA	0.22	0.74	0.01	0.21	1	NA
SVOC	2,2'-Oxybis(1-chloropropane)	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	2.88	7.35	NA	NA	NA	NA
SVOC	2,3,4,6-Tetrachlorophenol	mg/kg	8	0	0.0	1.7	10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	1833	18468	NA	NA	NA	NA
SVOC	2,4,5-Trichlorophenol	mg/kg	653	0	0.0	0.35	970	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	6110	61561	NA	NA	NA	NA
SVOC	2,4,6-Trichlorophenol	mg/kg	655	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	6.948293	24.624252	NA	NA	NA	NA
SVOC	2,4-Dichlorophenol	mg/kg	655	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	183	1847	NA	NA	NA	NA
SVOC	2,4-Dimethylphenol	mg/kg	667	4	0.6	0.17	190	0.067	0.24	0.18	0.205	0.069	NA	0.00	0.00	NA	0.00	0.00	NA	NA	1222	12312	NA	29	18,000	NA
SVOC	2,4-Dinitrophenol	mg/kg	637	0	0.0	0.82	970	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	122	1231	NA	NA	NA	NA
SVOC	2,4-Dinitrotoluene	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	122	1231	NA	NA	NA	NA
SVOC	2,6-Dinitrotoluene	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	61.103097	615.606291	NA	NA	NA	NA
SVOC	2-Chloronaphthalene	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	4937	23383	NA	3,900	27,000	NA
SVOC	2-Chlorophenol	mg/kg	655	1	0.2	0.33	190	0.17	0.17	0.17	0.17	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	63.398457	235.76766	NA	NA	NA	NA
SVOC	2-Methylnaphthalene	mg/kg	1,827	337	18.5	0.068	190	0.008	280	1.96	0.057	16	NA	NA	NA	0.27	0.00	0.00	NA	NA	NA	NA	0.18	150	800	NA
SVOC	2-Methylphenol	mg/kg	655	3	0.5	0.33	190	0.075	0.1	0.085	0.08	0.011	NA	0.00	0.00	NA	0.00	0.00	NA	NA	3055	30780	NA	30	44,000	NA
SVOC	2-Nitroaniline	mg/kg	654	1	0.2	0.82	970	0.31	0.31	0.31	0.31	NA	NA	0.00	0.00	NA	0.00	0.00	NA	NA	183	1830	NA	1.5	2,600	NA
SVOC	2-Nitrophenol	mg/kg	658	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA

TABLE 2-10: PARCEL-WIDE SUMMARY STATISTICS OF SOIL ANALYTICAL DATA (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HPAL	Detects Greater than EPA Residential PRG 2004	Detects Greater than EPA Industrial PRG 2004	Detects Greater than Parcel C PQL	Detects Greater than Parcel C Residential Soil PRG 06	Detects Greater than Parcel C Industrial Soil PRG 06	Detects Greater than Parcel C Recreational RBC 06	HPAL	EPA Residential PRG 2004	EPA Industrial PRG 2004[1]	Parcel C PQL	Parcel C Residential Soil PRG 06	Parcel C Industrial Soil PRG 06	Parcel C Recreational RBC 06
SVOC	3,3'-Dichlorobenzidine	mg/kg	655	1	0.2	0.34	390	0.036	0.036	0.036	0.036	NA	NA	0.00	0.00	0.00	1.00	0.00	NA	NA	1.08	3.83	1.3	0.008	2.1	NA
SVOC	3-Nitroaniline	mg/kg	656	0	0.0	0.82	970	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	18.331	82.081	NA	NA	NA	NA
SVOC	4,6-Dinitro-2-methylphenol	mg/kg	647	0	0.0	0.82	970	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	6.11031	61.5606	NA	NA	NA	NA
SVOC	4-Bromophenyl-phenylether	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
SVOC	4-Chloro-3-methylphenol	mg/kg	655	1	0.2	0.33	190	0.18	0.18	0.18	0.18	NA	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	9.2	4,400	NA
SVOC	4-Chloroaniline	mg/kg	657	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	244	2462	NA	NA	NA	NA
SVOC	4-Chlorophenyl-phenylether	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
SVOC	4-Methylphenol	mg/kg	655	5	0.8	0.33	190	0.076	1.3	0.49	0.38	0.43	NA	0.00	0.00	NA	0.00	0.00	NA	NA	306	3078	NA	3	4,400	NA
SVOC	4-Nitroaniline	mg/kg	657	0	0.0	0.82	970	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	23.161	82.081	NA	NA	NA	NA
SVOC	4-Nitrophenol	mg/kg	655	0	0.0	0.82	970	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	0.29	440	NA
SVOC	Acenaphthene	mg/kg	2,077	155	7.5	0.05	190	0.009	39	0.86	0.1	3.7	NA	0.00	0.00	0.23	0.00	0.00	NA	NA	3682	29219	0.33	3,700	38,000	NA
SVOC	Acenaphthylene	mg/kg	2,076	54	2.6	0.05	190	0.009	0.91	0.11	0.048	0.17	NA	NA	NA	0.07	0.00	0.00	NA	NA	NA	NA	0.33	3,700	38,000	NA
SVOC	Acetophenone	mg/kg	8	0	0.0	0.36	0.44	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
SVOC	Aniline	mg/kg	8	0	0.0	0.87	5.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	85.329914	302.40309	NA	NA	NA	NA
SVOC	Anthracene	mg/kg	2,077	262	12.6	0.05	190	0.008	35	0.83	0.0665	3.5	NA	0.00	0.00	0.23	0.00	0.00	NA	NA	21896	100000	0.33	22,000	390,000	NA
SVOC	Atrazine	mg/kg	8	0	0.0	0.36	0.44	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	2.19	7.76	NA	NA	NA	NA
SVOC	Azobenzene	mg/kg	8	0	0.0	0.35	2.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	4.421644	15.669998	NA	NA	NA	NA
SVOC	Benzaldehyde	mg/kg	8	2	25.0	0.36	0.44	0.02	0.024	0.022	0.022	0.0020	NA	0.00	0.00	NA	NA	NA	NA	NA	6110	61561	NA	NA	NA	NA
SVOC	Benzo(a)anthracene	mg/kg	2,153	600	27.9	0.05	190	0.008	32	0.55	0.076	2.4	NA	0.12	0.04	0.20	0.18	0.04	NA	NA	0.62	2.11	0.33	0.37	1.8	NA
SVOC	Benzo(a)pyrene	mg/kg	2,144	548	25.6	0.05	190	0.008	27	0.54	0.099	2.1	NA	0.64	0.29	0.21	0.73	0.33	0.41	NA	0.06	0.21	0.33	0.037	0.18	0.13
SVOC	Benzo(b)fluoranthene	mg/kg	2,153	670	31.1	0.05	190	0.008	27	0.48	0.0755	2.0	NA	0.10	0.04	0.17	0.16	0.04	NA	NA	0.62	2.11	0.33	0.34	1.8	NA
SVOC	Benzo(g,h,i)perylene	mg/kg	2,065	474	23.0	0.05	190	0.008	11	0.34	0.077	1.0	NA	NA	NA	0.18	0.00	0.00	NA	NA	NA	NA	0.33	1,600	23,000	NA
SVOC	Benzo(k)fluoranthene	mg/kg	2,114	385	18.2	0.05	190	0.008	6.5	0.32	0.091	0.76	NA	0.17	0.06	0.21	0.19	0.04	NA	NA	0.38	1.28	0.33	0.34	1.8	NA
SVOC	Benzoic acid	mg/kg	68	0	0.0	1.6	970	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	100000	100000	NA	2,200	3,500,000	NA
SVOC	Benzyl alcohol	mg/kg	68	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	18331	100000	NA	NA	NA	NA
SVOC	Biphenyl	mg/kg	8	1	12.5	0.36	0.44	0.031	0.031	0.031	0.031	NA	NA	0.00	0.00	NA	0.00	0.00	NA	NA	3014	23341	NA	3,000	30,000	NA
SVOC	bis(2-Chloroethoxy)methane	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
SVOC	bis(2-Chloroethyl)ether	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.22	0.58	NA	NA	NA	NA
SVOC	bis(2-Ethylhexyl)phthalate	mg/kg	669	20	3.0	0.016	110	0.08	3.2	0.54	0.195	0.74	NA	0.00	0.00	0.30	0.15	0.00	NA	NA	34.741465	123.121258	0.33	1.1	180	NA
SVOC	Butylbenzylphthalate	mg/kg	655	0	0.0	0.017	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	12221	100000	NA	11,000	180,000	NA
SVOC	Caprolactam	mg/kg	8	0	0.0	0.36	0.44	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	30552	100000	NA	NA	NA	NA
SVOC	Carbazole	mg/kg	611	8	1.3	0.17	110	0.026	0.34	0.11	0.0685	0.11	NA	0.00	0.00	NA	0.00	0.00	NA	NA	24.319026	86.184881	NA	2.2	120	NA
SVOC	Chrysene	mg/kg	2,154	746	34.6	0.05	190	0.009	44	0.56	0.0805	2.6	NA	0.03	0.01	0.21	0.03	0.00	NA	NA	3.780659	12.834248	0.33	3.3	18	NA
SVOC	di-n-Butylphthalate	mg/kg	659	7	1.1	0.019	190	0.056	0.14	0.098	0.091	0.029	NA	0.00	0.00	NA	0.00	0.00	NA	NA	6110	61561	NA	5,500	88,000	NA
SVOC	di-n-Octylphthalate	mg/kg	647	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	2444	24624	NA	2,200	35,000	NA
SVOC	Dibenz(a,h)anthracene	mg/kg	2,095	146	7.0	0.05	190	0.009	3.9	0.21	0.049	0.49	NA	0.45	0.17	0.12	0.45	0.14	NA	NA	0.06	0.21	0.33	0.058	0.29	NA
SVOC	Dibenzofuran	mg/kg	671	37	5.5	0.17	240	0.011	3.4	0.34	0.095	0.68	NA	0.00	0.00	NA	0.00	0.00	NA	NA	145	1563	NA	150	2,500	NA
SVOC	Diethylphthalate	mg/kg	671	0	0.0	0.042	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	48882	100000	NA	660	700,000	NA
SVOC	Dimethylphthalate	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	100000	100000	NA	NA	NA	NA
SVOC	Fluoranthene	mg/kg	2,086	597	28.6	0.05	190	0.008	80	0.92	0.12	4.5	NA	0.00	0.00	0.27	0.00	0.00	NA	NA	2294	22000	0.33	2,000	30,000	NA
SVOC	Fluorene	mg/kg	2,081	302	14.5	0.05	190	0.008	36	0.64	0.055	2.7	NA	0.00	0.00	0.17	0.00	0.00	NA	NA	2747	26281	0.33	2,700	39,000	NA
SVOC	Hexachlorobenzene	mg/kg	659	1	0.2	0.33	190	0.082	0.082	0.082	0.082	NA	NA	0.00	0.00	0.00	1.00	0.00	NA	NA	0.30	1.08	0.33	0.054	1.4	NA
SVOC	Hexachlorobutadiene	mg/kg	953	0	0.0	0.0022	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	6.235648	22.098687	NA	NA	NA	NA
SVOC	Hexachlorocyclopentadiene	mg/kg	654	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	365	3659	NA	NA	NA	NA
SVOC	Hexachloroethane	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	34.741465	123.121258	NA	NA	NA	NA
SVOC	Indeno(1,2,3-cd)pyrene	mg/kg	2,133	370	17.4	0.05	190	0.008	14	0.35	0.074	1.1	NA	0.09	0.04	0.15	0.14	0.05	NA	NA	0.62	2.11	0.33	0.35	1.8	NA
SVOC	Isophorone	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	512	512	NA	2.2	2,600	NA
SVOC	n-Nitroso-di-n-propylamine	mg/kg	671	1	0.2	0.17	190	0.11	0.11	0.11	0.11	NA	NA	1.00	0.00	0.00	1.00	0.00	NA	NA	0.07	0.25	0.33	0.00017	0.35	NA
SVOC	n-Nitrosodimethylamine	mg/kg	10	0	0.0	0.35	2.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.01	0.03	NA	NA	NA	NA
SVOC	n-Nitrosodiphenylamine	mg/kg	671	2	0.3	0.046	190	0.067	0.16	0.11	0.1135	0.047	NA	0.00	0.00	NA	0.00	0.00	NA	NA	99.261329	351.775023	NA	0.68	270	NA
SVOC	Nitrobenzene	mg/kg	659	0	0.0	0.33	190	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	19.641205	102.934817	NA	NA	NA	NA
SVOC	Pentachlorophenol	mg/kg	667	1	0.2	0.82	970	0.1	0.1	0.1	0.1	NA	NA	0.00	0.00	NA	0.00	0.00	NA	NA	2.98	9.00	NA	2.6	11	NA
SVOC	Phenacetin	mg/kg	6	0	0.0	0.14	0.66	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
SVOC	Phenanthrene	mg/kg	2,083	753	36.2	0.05	190	0.008	130	1.03	0.092	6.7	NA	NA	NA	0.21	0.00	0.00	NA	NA	NA	NA	0.33	22,000	390,000	NA
SVOC	Phenol	mg/kg	667	5	0.8	0.043	190	0.042	1.7	0.63	0.1	0.69	NA	0.00	0.00	NA	0.00	0.00	NA	NA	18331	100000	NA	69	260,000	NA
SVOC	Pyrene	mg/kg	2,077	765	36.8	0.05	190	0.008	71	1.12	0.11	5.4	NA	0.00	0.00	0.27	0.00	0.00	NA	NA	2316	29126	0.33	2,300	55,000	NA
SVOC	Pyridine	mg/kg	8	0	0.0	0.35	2.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	61.103097	615.606291	NA	NA	NA	NA
TPHEXT	Diesel range organics	mg/kg	2,015	752	37.3	1	12,000	1.1	38,000	843	43	2615	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPHEXT	Motor oil range organics	mg/kg	1,795	1,114	62.1	5	12,000	3	72,000	753	85.5	3169	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPHEXT	TPH-Extractable unknown hydrocarbon	mg/kg	58	22	37.9	1.1	20,000	15	210,000	10,122	65	43652	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPHEXT	TPH-JP5 (aviation fuel)	mg/kg	6	0	0.0	1.1	1.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
TPHEXT	TPH-kerosene	mg/kg	19	0	0.0	1.1	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
TPHPRG	Gasoline range organics	mg/kg	1,945	209	10.8	0.15	2,800	0.029	5,500	190	3	664	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPHPRG	TPH-Purgeable unknown hydrocarbon	mg/kg	79	6	7.6	0.006	56	1	1,600	433	161.5	576	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOC	1,1,1,2-Tetrachloroethane	mg/kg	303	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	3.19	7.28	NA	NA	NA	NA
VOC	1,1,1-Trichloroethane	mg/kg	1,286	2	0.2	0.0022	28	0.008	0.0418	0.025	0.0249	0.017	NA	0.00	0.00	NA	0.00	0.00	NA	NA	1200	1200	NA	2,000	7,000	NA
VOC	1,1,2,2-Tetrachloroethane	mg/kg	1,242	0	0.0	0.0022	28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.41	0.93	NA	0.39	0.96	NA
VOC	1,1,2-Trichloro-1,2,2-trifluoroethane	mg/kg	311	29	9.3	0.004	4.8	0.001	18	1.67	0.024	4.1	NA	0.00	0.00	NA	NA	NA	NA	NA	5600	5600	NA	NA	NA	NA
VOC	1,1,2-Trichloroethane	mg/kg	1,280	11	0.9	0.0022	28	0.004	0.367	0.042	0.009	0.10	NA	0.00	0.00	NA	0.00	0.00	NA	NA	0.73	1.61	NA	0.7	1.6	NA
VOC	1,1-Dichloroethane	mg/kg	1,286	1	0.1	0.0022	28	0.00092	0.00092	0.001	0.00092	NA	NA	0.00	0.00	NA	0.00	0.00	NA	NA	2.79	6.01	NA	2.8	6	NA
VOC	1,1-Dichloroethene	mg/kg	1,287	10	0.8	0.0022	28	0.0004	0.05	0.014	0.006825	0.015	NA	0.00	0.00	NA	0.00	0.00	NA	NA	124	413	NA	120	420	NA
VOC	1,1-Dichloropropene	mg/kg	297	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
VOC	1,2,3-Trichlorobenzene	mg/kg	259	9	3.5	0.0022	1.1	0.00197	0.712	0.15	0.00248	0.23	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	68	240	NA

TABLE 2-10: PARCEL-WIDE SUMMARY STATISTICS OF SOIL ANALYTICAL DATA (CONTINUED)

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	Minimum Detection Limit	Maximum Detection Limit	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HPAL	Detects Greater than EPA Residential PRG 2004	Detects Greater than EPA Industrial PRG 2004	Detects Greater than Parcel C PQL	Detects Greater than Parcel C Residential Soil PRG 06	Detects Greater than Parcel C Industrial Soil PRG 06	Detects Greater than Parcel C Recreational RBC 06	HPAL	EPA Residential PRG 2004	EPA Industrial PRG 2004[1]	Parcel C PQL	Parcel C Residential Soil PRG 06	Parcel C Industrial Soil PRG 06	Parcel C Recreational RBC 06
VOC	1,2,3-Trichloropropane	mg/kg	300	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.03	0.08	NA	NA	NA	NA
VOC	1,2,4-Trichlorobenzene	mg/kg	1,103	23	2.1	0.0022	190	0.000712	7.32	0.98	0.14	2.0	NA	0.00	0.00	NA	0.00	0.00	NA	NA	650	3000	NA	68	240	NA
VOC	1,2,4-Trimethylbenzene	mg/kg	294	35	11.9	0.0022	4.74	0.0017	80.9	8.80	0.104	20	NA	0.09	0.00	NA	0.09	0.00	NA	NA	51.608055	170.271546	NA	52	170	NA
VOC	1,2-Dibromo-3-chloropropane	mg/kg	455	0	0.0	0.0022	4.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.03	0.08	NA	NA	NA	NA
VOC	*1,2-Dibromoethane*	*mg/kg*	*290*	*0*	*0.0*	*0.00367*	*4.8*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	*ND*	NA	*0.03*	*0.07*	NA	NA	NA	NA
VOC	1,2-Dichlorobenzene	mg/kg	1,124	59	5.3	0.0022	190	0.002	400	13.66804	0.14	58	NA	0.00	0.00	NA	0.00	0.00	NA	NA	600	600	NA	1,100	4,200	NA
VOC	1,2-Dichloroethane	mg/kg	1,283	20	1.6	0.0022	28	0.002	12	1.27	0.01395	3.2	NA	0.15	0.15	0.55	0.15	0.15	NA	NA	0.28	0.60	0.01	0.28	0.61	NA
VOC	1,2-Dichloroethene (Total)	mg/kg	607	33	5.4	0.005	28	0.0008	0.24	0.028	0.009	0.054	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	43	150	NA
VOC	1,2-Dichloropropane	mg/kg	1,283	0	0.0	0.0022	28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.34	0.74	NA	NA	NA	NA
VOC	1,3,5-Trimethylbenzene	mg/kg	294	21	7.1	0.0022	4.74	0.0014	15.4	2.68	0.103	5.0	NA	0.00	0.00	NA	0.00	0.00	NA	NA	21.253287	69.711545	NA	21	70	NA
VOC	1,3-Dichlorobenzene	mg/kg	1,124	28	2.5	0.0022	190	0.00321	22	4.05	0.71	6.0	NA	0.00	0.00	NA	0.00	0.00	NA	NA	531	600	NA	530	2,200	NA
VOC	1,3-Dichloropropane	mg/kg	297	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	105	361	NA	NA	NA	NA
VOC	1,4-Dichlorobenzene	mg/kg	1,124	48	4.3	0.0022	190	0.00309	94	6.37	0.168	16	NA	0.27	0.19	0.85	0.31	0.21	NA	NA	3.45	7.87	0.01	2	4.5	NA
VOC	2,2-Dichloropropane	mg/kg	297	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
VOC	2-Butanone	mg/kg	1,280	25	2.0	0.001	28	0.003	0.089	0.016	0.012	0.017	NA	0.00	0.00	NA	0.00	0.00	NA	NA	22311	113264	NA	22,000	120,000	NA
VOC	2-Chlorotoluene	mg/kg	294	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	158	560	NA	NA	NA	NA
VOC	2-Hexanone	mg/kg	1,271	1	0.1	0.002	28	0.006	0.006	0.006	0.006	NA	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	22,000	120,000	NA
VOC	4-Chlorotoluene	mg/kg	294	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
VOC	4-Methyl-2-pentanone	mg/kg	1,269	10	0.8	0.00439	28	0.002	0.16	0.023	0.006	0.046	NA	0.00	0.00	NA	0.00	0.00	NA	NA	5281	47001	NA	5,300	66,000	NA
VOC	Acetone	mg/kg	1,132	117	10.3	0.001	16	0.00396	1.2	0.072	0.026	0.16	NA	0.00	0.00	NA	0.00	0.00	NA	NA	14127	54321	NA	14,000	56,000	NA
VOC	Benzene	mg/kg	1,428	222	15.6	0.00079	28	0.00049	9.1	0.96	0.0545	1.8	NA	0.27	0.25	0.65	0.32	0.28	NA	NA	0.64	1.41	0.01	0.18	0.39	NA
VOC	Bromobenzene	mg/kg	300	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	27.833212	92.151553	NA	NA	NA	NA
VOC	Bromochloromethane	mg/kg	297	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
VOC	Bromodichloromethane	mg/kg	1,283	0	0.0	0.0022	28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	0.82	1.83	NA	NA	NA	NA
VOC	Bromoform	mg/kg	1,275	7	0.6	0.0022	28	0.00111	0.028	0.011	0.0091	0.0081	NA	0.00	0.00	NA	NA	NA	NA	NA	61.57	218.20	NA	NA	NA	NA
VOC	Bromomethane	mg/kg	1,285	2	0.2	0.0042	28	0.0003	0.004	0.002	0.00215	0.0019	NA	0.00	0.00	NA	0.00	0.00	NA	NA	3.90	13.08	NA	3.8	13	NA
VOC	Carbon disulfide	mg/kg	1,280	72	5.6	0.0022	28	0.0003	0.046	0.005	0.00244	0.0070	NA	0.00	0.00	NA	0.00	0.00	NA	NA	355	720	NA	360	1,200	NA
VOC	Carbon tetrachloride	mg/kg	1,286	17	1.3	0.0022	28	0.0026	0.061	0.021	0.013	0.019	NA	0.00	0.00	NA	0.00	0.00	NA	NA	0.25	0.55	NA	0.091	0.2	NA
VOC	Chlorobenzene	mg/kg	1,277	40	3.1	0.0022	28	0.0002	10	1.31	0.165	2.5	NA	0.00	0.00	NA	0.00	0.00	NA	NA	151	530	NA	150	540	NA
VOC	Chloroethane	mg/kg	1,286	0	0.0	0.00439	28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	3.03	6.49	NA	NA	NA	NA
VOC	Chloroform	mg/kg	1,286	33	2.6	0.0022	28	0.00083	0.044	0.010	0.006	0.011	NA	0.00	0.00	NA	0.00	0.00	NA	NA	0.22	0.47	NA	0.22	0.47	NA
VOC	Chloromethane	mg/kg	1,266	4	0.3	0.0042	28	0.0019	0.018	0.007	0.004	0.0065	NA	0.00	0.00	NA	0.00	0.00	NA	NA	46.85	155.75	NA	47	160	NA
VOC	cis-1,2-Dichloroethene	mg/kg	679	84	12.4	0.0019	4.8	0.0008	18	0.55	0.008	2.6	NA	0.00	0.00	NA	0.00	0.00	NA	NA	42.9419	146.301126	NA	43	150	NA
VOC	cis-1,3-Dichloropropene	mg/kg	1,108	0	0.0	0.0039	28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
VOC	Cyclohexane	mg/kg	163	83	50.9	0.008	4.8	0.001	4.3	0.56	0.47	0.68	NA	0.00	0.00	NA	NA	NA	NA	NA	140	140	NA	NA	NA	NA
VOC	*Dibromochloromethane*	mg/kg	1,279	0	0.0	0.0022	28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	1.11	2.55	NA	NA	NA	NA
VOC	Dibromomethane	mg/kg	303	0	0.0	0.0022	1.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	66.908047	233.550478	NA	NA	NA	NA
VOC	Dichlorodifluoromethane	mg/kg	466	3	0.6	0.0022	4.8	0.002	0.0022	0.002	0.002	0.000094	NA	0.00	0.00	NA	NA	NA	NA	NA	93.88	308.06	NA	NA	NA	NA
VOC	Ethylbenzene	mg/kg	1,391	117	8.4	0.00079	28	0.0004	23	0.42	0.081	2.2	NA	0.00	0.00	NA	0.00	0.00	NA	NA	395	395	NA	1,900	7,700	NA
VOC	Isopropylbenzene	mg/kg	451	36	8.0	0.0022	4.8	0.00108	2.9	0.20	0.0731	0.50	NA	0.00	0.00	NA	0.00	0.00	NA	NA	572	1977	NA	160	520	NA
VOC	m,p-Xylenes	mg/kg	377	37	9.8	0.00079	2.17	0.00069	9.39	0.62	0.0658	2.0	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	270	900	NA
VOC	Methyl acetate	mg/kg	163	16	9.8	0.008	4.8	0.0008	0.96	0.23	0.095	0.28	NA	0.00	0.00	NA	NA	NA	NA	NA	22087	91531	NA	NA	NA	NA
VOC	Methylcyclohexane	mg/kg	162	97	59.9	0.008	5	0.001	25	0.64	0.24	2.6	NA	0.00	0.00	NA	NA	NA	NA	NA	2591	8716	NA	NA	NA	NA
VOC	Methylene chloride	mg/kg	1,286	128	10.0	0.0009	28	0.001	1.41	0.11	0.007955	0.26	NA	0.00	0.00	NA	0.00	0.00	NA	NA	9.10699	20.526525	NA	4.3	9.9	NA
VOC	n-Butylbenzene	mg/kg	294	3	1.0	0.0022	1.1	0.027	2.9	1.05	0.211	1.3	NA	0.00	0.00	NA	0.00	0.00	NA	NA	240	240	NA	580	2,300	NA
VOC	Naphthalene	mg/kg	2,279	384	16.9	0.0022	190	0.00278	110	0.98	0.037	7.7	NA	0.05	0.03	0.98	0.05	0.03	NA	NA	1.70	4.20	0.004	1.7	4.7	NA
VOC	o-Xylene	mg/kg	377	29	7.7	0.00079	2.17	0.0007	3.18	0.29	0.048	0.76	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	270	900	NA
VOC	para-Isopropyl Toluene	mg/kg	294	25	8.5	0.0022	4.58	0.00406	12.6	1.16	0.111	3.0	NA	NA	NA	NA	0.00	0.00	NA	NA	NA	NA	NA	630	2,200	NA
VOC	Propylbenzene	mg/kg	294	19	6.5	0.0022	4.74	0.00302	12.3	1.93	0.15	3.4	NA	0.00	0.00	NA	0.00	0.00	NA	NA	240	240	NA	580	2,300	NA
VOC	sec-Butylbenzene	mg/kg	294	21	7.1	0.0022	1.1	0.0017	0.58	0.17	0.172	0.14	NA	0.00	0.00	NA	0.00	0.00	NA	NA	220	220	NA	450	1,700	NA
VOC	Styrene	mg/kg	1,269	2	0.2	0.0022	28	0.006	0.009	0.008	0.0075	0.0015	NA	0.00	0.00	NA	0.00	0.00	NA	NA	1700	1700	NA	4,400	19,000	NA
VOC	tert-Butyl methyl ether	mg/kg	707	4	0.6	0.0022	4.8	0.00049	0.088	0.023	0.001735	0.038	NA	0.00	0.00	NA	NA	NA	NA	NA	32.00	70.00	NA	NA	NA	NA
VOC	tert-Butylbenzene	mg/kg	294	2	0.7	0.0022	1.1	0.0025	0.0092	0.006	0.00585	0.0034	NA	0.00	0.00	NA	0.00	0.00	NA	NA	390	390	NA	530	2,000	NA
VOC	Tetrachloroethene	mg/kg	1,300	172	13.2	0.001	28	0.0008	139	2.07	0.00699	15	NA	0.08	0.05	0.38	0.08	0.04	NA	NA	0.48	1.31	0.01	0.48	1.5	NA
VOC	Toluene	mg/kg	1,401	246	17.6	0.00079	28	0.0003	3.7	0.31	0.0096	0.65	NA	0.00	0.00	NA	0.00	0.00	NA	NA	520	520	NA	660	2,200	NA
VOC	trans-1,2-Dichloroethene	mg/kg	679	27	4.0	0.0019	4.8	0.001	0.898	0.088	0.004	0.21	NA	0.00	0.00	NA	NA	NA	NA	NA	69.49	234.82	NA	NA	NA	NA
VOC	trans-1,3-Dichloropropene	mg/kg	1,105	0	0.0	0.0039	28	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	NA	NA
VOC	Trichloroethene	mg/kg	1,284	287	22.4	0.0022	28	0.001	120	2.11	0.022	9.6	NA	0.35	0.26	0.64	0.09	0.06	NA	NA	0.05	0.11	0.01	2.9	6.6	NA
VOC	Trichlorofluoromethane	mg/kg	486	26	5.4	0.0022	4.8	0.0013	1.12	0.088	0.0065	0.25	NA	0.00	0.00	NA	0.00	0.00	NA	NA	386	2000	NA	390	1,300	NA
VOC	Vinyl acetate	mg/kg	205	0	0.0	0.0042	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	426	1396	NA	NA	NA	NA
VOC	Vinyl chloride	mg/kg	1,285	26	2.0	0.0042	28	0.002	1.5	0.11	0.012	0.29	NA	0.23	0.04	0.54	0.42	0.23	NA	NA	0.08	0.75	0.01	0.024	0.055	NA
VOC	Xylene (Total)	mg/kg	1,024	172	16.8	0.002	28	0.0004	9.8	0.41	0.01	1.0	NA	0.00	0.00	NA	0.00	0.00	NA	NA	271	420	NA	270	900	NA

Notes: This table includes soil analytical data collected at Parcel C from 0 to 10 feet bgs. Samples that have been excavated or otherwise removed were excluded from this data set.

1 EPA. 2004. "Region 9 Preliminary Remediation Goals." October 1. Available Online at < http://www.epa.gov/region09/waste/sfund/prg/index.htm >.

bgs	Below ground surface	HPAL	Hunters Point ambient level	PRG	Preliminary remediation goal
BHC	Benzene hexachloride	mg/kg	Milligram per kilogram	RBC	Risk-based concentration
CHROM	Chromium	NA	Not available	SVOC	Semivolatile organic compound
CYAN	Cyanide	ND	Not detected	TPHEXT	Total petroleum hydrocarbons-extractables
DDD	Dichlorodiphenyldichloroethane	ORGPB	Organic Lead	TPHPRG	Total petroleum hydrocarbons-purgeables
DDE	Dichlorodiphenyldichloroethene	PCB	Polychlorinated biphenyl	TPH	Total petroleum hydrocarbons
DDT	Dichlorodiphenyltrichloroethene	PEST	Pesticides	VOC	Volatile organic compound
EPA	U.S. Environmental Protection Agency	PQL	Practical quantitation limit		

TABLE 2-11: SOIL COCS AND TOTAL TPH COMPARISON TO CRITERIA BY REDEVELOPMENT BLOCK

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

RB	Reuse Scenario	Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	Minimum Detection Limit	Maximum Detection Limit	Screening Criterion	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Number of Detections Greater than the Screening Criterion	Detects Greater than the Screening Criterion	ND Greater than the Screening Criterion
10	Residential	METAL	Antimony	mg/kg	162	106	65.4	0.26	10	10	30.1	7.05	4.75	24	0.23	0.00
10	Residential	METAL	Arsenic	mg/kg	150	103	68.7	0.2	4.2	11.1	11.3	3.29	2.80	1	0.01	0.00
10	Residential	METAL	Iron	mg/kg	136	136	100.0	0.47	50	58,000	93700	32576	32400	5	0.04	All Detected
10	Residential	METAL	Lead	mg/kg	141	124	87.9	0.15	4.9	155	380	26.51	7.70	6	0.05	0.00
10	Residential	METAL	Manganese	mg/kg	158	158	100.0	0.06	3.8	1,431	3940	837	694	18	0.11	All Detected
10	Residential	METAL	Nickel	mg/kg	136	136	100.0	0.078	10	2,650	5080	820	444	5	0.04	All Detected
10	Residential	PCB	Aroclor-1260	mg/kg	156	41	26.3	0.004	3.3	0.21	1.2	0.141	0.037	7	0.17	0.09
10	Residential	PEST	Dieldrin	mg/kg	85	3	3.5	0.004	0.33	0.004	0.004	0.003	0.002	0	0.00	0.43
10	Residential	PEST	gamma-BHC (Lindane)	mg/kg	85	1	1.2	0.002	0.17	0.003	0.005	0.005	0.005	1	1.00	0.38
10	Residential	PEST	Heptachlor epoxide	mg/kg	85	5	5.9	0.002	0.17	0.002	0.004	0.003	0.003	3	0.60	0.44
10	Residential	SVOC	3,3'-Dichlorobenzidine	mg/kg	94	1	1.1	0.36	390	0.36	0.036	0.036	0.036	0	0.00	0.95
10	Residential	SVOC	Benzo(a)anthracene	mg/kg	167	36	21.6	0.075	190	0.37	1.8	0.172	0.092	3	0.08	0.50
10	Residential	SVOC	Benzo(a)pyrene	mg/kg	167	39	23.4	0.075	190	0.33	1.9	0.154	0.039	5	0.13	0.63
10	Residential	SVOC	Benzo(b)fluoranthene	mg/kg	167	36	21.6	0.075	190	0.34	3	0.201	0.048	6	0.17	0.63
10	Residential	SVOC	Benzo(k)fluoranthene	mg/kg	147	20	13.6	0.075	190	0.34	1.1	0.208	0.073	5	0.25	0.68
10	Residential	SVOC	Dibenz(a,h)anthracene	mg/kg	147	9	6.1	0.075	190	0.33	0.13	0.046	0.037	0	0.00	0.63
10	Residential	SVOC	Indeno(1,2,3-cd)pyrene	mg/kg	167	23	13.8	0.075	190	0.35	0.51	0.087	0.042	1	0.04	0.58
10	Residential	TPH	Total TPH	mg/kg	147	97	66.0	0	0	3500	14000	2329	1060	19	0.20	0.00
10	Residential	VOC	Naphthalene	mg/kg	118	18	15.3	0.075	190	1.7	6.3	0.797	0.345	2	0.11	0.12
10	Residential	VOC	Tetrachloroethene	mg/kg	77	9	11.7	0.005	1.4	0.48	1.1	0.195	0.005	2	0.22	0.01
11	Residential	METAL	Copper	mg/kg	123	123	100.0	0.1	6.3	159	374	55.69	36.90	5	0.04	All Detected
11	Residential	METAL	Iron	mg/kg	42	42	100.0	0.49	24	58,000	68,900	32433	30600	1	0.02	All Detected
11	Residential	METAL	Manganese	mg/kg	106	106	100.0	0.063	5.9	1,431	5,630	906	754	11	0.10	All Detected
11	Residential	PCB	Aroclor-1260	mg/kg	161	62	38.5	0.004	0.37	0.21	3.2	0.293	0.067	12	0.19	0.00
11	Residential	SVOC	Benzo(a)anthracene	mg/kg	124	41	33.1	0.079	7.6	0.37	5.4	0.193	0.024	2	0.05	0.42
11	Residential	SVOC	Benzo(a)pyrene	mg/kg	127	33	26.0	0.069	7.6	0.33	4.8	0.208	0.031	2	0.06	0.52
11	Residential	SVOC	Benzo(b)fluoranthene	mg/kg	124	38	30.7	0.069	7.6	0.34	6.9	0.248	0.033	1	0.03	0.56
11	Residential	SVOC	Benzo(k)fluoranthene	mg/kg	124	24	19.4	0.069	7.6	0.34	4.4	0.261	0.039	1	0.04	0.48
11	Residential	SVOC	Chrysene	mg/kg	116	50	43.1	0.069	7.6	3.3	6.8	0.231	0.042	1	0.02	0.03
11	Residential	SVOC	Dibenz(a,h)anthracene	mg/kg	117	5	4.3	0.069	7.6	0.33	1	0.221	0.017	1	0.20	0.47
11	Residential	SVOC	Indeno(1,2,3-cd)pyrene	mg/kg	119	21	17.7	0.069	7.6	0.35	2	0.123	0.018	1	0.05	0.50
11	Residential	TPH	Total TPH	mg/kg	146	71	48.6	0	0	3,500	27,530	1197	130	5	0.07	0.00
11	Residential	VOC	1,2-Dichloroethane	mg/kg	129	8	6.2	0.00342	4.8	0.28	12	3.15	0.10	3	0.38	0.12
11	Residential	VOC	1,4-Dichlorobenzene	mg/kg	131	21	16.0	0.00342	25	2	94	8.89	0.16	7	0.33	0.03
11	Residential	VOC	Naphthalene	mg/kg	150	26	17.3	0.00342	21	1.7	19	1.57	0.02	4	0.15	0.02
11	Residential	VOC	Tetrachloroethene	mg/kg	129	23	17.8	0.00342	4.8	0.48	139	14.97	0.01	5	0.22	0.07
11	Residential	VOC	Trichloroethene	mg/kg	129	39	30.2	0.00342	7.5	2.9	120	7.67	0.06	7	0.18	0.00
11	Residential	VOC	Vinyl chloride	mg/kg	129	18	14.0	0.0062	4.8	0.024	1.5	0.141	0.027	10	0.56	0.14
13	Residential	METAL	Iron	mg/kg	23	23	100.0	0.7	11	58,000	70,600	42291	44600	3	0.13	All Detected
13	Residential	METAL	Manganese	mg/kg	53	53	100.0	0.02	0.8	1,431	4,480	1266	960	16	0.30	All Detected
13	Residential	METAL	Vanadium	mg/kg	23	23	100.0	0.1	0.8	117	165	85.38	74.00	6	0.26	All Detected
13	Residential	PEST	Dieldrin	mg/kg	22	2	9.1	0.003	0.019	0.004	0.045	0.025	0.025	1	0.50	0.10
13	Residential	TPH	Total TPH	mg/kg	33	11	33.3	0	0	3,500	1,900	273	73	0	0.00	0.00
18	Residential	TPH	Total TPH	mg/kg	155	129	83.2	0	0	3,500	23,800.87	759	29	6	0.05	0.00
18	Residential	METAL	Arsenic	mg/kg	60	55	91.7	0.26	6.2	11.1	16.4	5.74	5.40	3	0.05	0.00
18	Residential	METAL	Manganese	mg/kg	66	66	100.0	0.02	8	1431	3,660	861	795	2	0.03	All Detected
18	Residential	METAL	Vanadium	mg/kg	55	55	100.0	0.1	0.73	117	121	72.40	72.40	1	0.02	All Detected
18	Residential	PEST	gamma-BHC (Lindane)	mg/kg	76	1	1.3	0.0017	0.032	0.003	0.0089	0.009	0.009	1	1.00	0.17
18	Residential	PEST	Heptachlor epoxide b	mg/kg	12	1	8.3	0.0018	0.032	0.003	0.0035	0.004	0.004	1	1.00	0.73

TABLE 2-11: SOIL COCS AND TOTAL TPH COMPARISON TO CRITERIA BY REDEVELOPMENT BLOCK (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

RB	Reuse Scenario	Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	Minimum Detection Limit	Maximum Detection Limit	Screening Criterion	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Number of Detections Greater than the Screening Criterion	Detects Greater than the Screening Criterion	ND Greater than the Screening Criterion
18	Residential	SVOC	Benzo(a)pyrene	mg/kg	208	17	8.2	0.051	11	0.33	0.14	0.033	0.023	0	0.00	0.25
18	Residential	SVOC	Bis(2-ethylhexyl)phthalate	mg/kg	52	2	3.9	0.035	11	1.1	1.5	0.790	0.790	1	0.50	0.06
18	Residential	VOC	Benzene	mg/kg	297	180	60.6	0.0039	1.1	0.18	9.1	1.17	0.10	68	0.38	0.00
22	Industrial	METAL	Arsenic	mg/kg	231	147	63.6	0.1	11.1	11.1	200	16.85	5.50	44	0.30	0.00
22	Industrial	METAL	Lead	mg/kg	226	185	81.9	0.12	11.6	800	2,610	175	36	12	0.06	0.00
22	Industrial	ORGPB	Organic lead	mg/kg	1	1	100.0	0.57	0.57	0.5	0.93	0.930	0.930	1	1.00	All Detected
22	Industrial	SVOC	Benzo(a)pyrene	mg/kg	220	116	52.7	0.069	14	0.33	21	1.23	0.19	39	0.34	0.37
22	Industrial	TPH	Total TPH	mg/kg	237	186	78.5	0	0	3,500	110,095	2462	137	24	0.13	0.00
22	Industrial	VOC	Tetrachloroethene	mg/kg	66	16	24.2	0.0051	3.3	1.5	1.6	0.127	0.004	1	0.06	0.02
22	Industrial	VOC	Vinyl chloride	mg/kg	67	2	3.0	0.009	3.3	0.055	0.25	0.127	0.127	1	0.50	0.05
23	Residential	METAL	Arsenic	mg/kg	338	255	75.4	0.2	23	11.1	86	8.85	4.70	45	0.18	0.01
23	Residential	METAL	Cadmium	mg/kg	332	169	50.9	0.02	22	3.5	11	1.93	1.20	28	0.17	0.07
23	Residential	METAL	Copper	mg/kg	466	462	99.1	0.04	53	159	7,600	156	65	86	0.19	0.00
23	Residential	METAL	Iron	mg/kg	48	48	100.0	0.98	21.3	58,000	125,000	37835	35950	5	0.10	All Detected
23	Residential	METAL	Lead	mg/kg	312	258	82.7	0.1	13	155	1,730	45.54	8.55	23	0.09	0.00
23	Residential	METAL	Manganese	mg/kg	461	461	100.0	0.03	67	1,431	35,000	2339	1020	167	0.36	All Detected
23	Residential	METAL	Mercury	mg/kg	88	58	65.9	0.009	0.27	2.28	8.7	0.672	0.245	4	0.07	0.00
23	Residential	METAL	Thallium	mg/kg	246	68	27.6	0.12	155	5	23	3.75	1.60	13	0.19	0.21
23	Residential	METAL	Vanadium	mg/kg	80	80	100.0	0.1	11	117	636	85.64	75.60	11	0.14	All Detected
23	Residential	METAL	Zinc	mg/kg	361	361	100.0	0.1	21	373	2,530	169	64	37	0.10	All Detected
23	Residential	ORGPB	Organic Lead	mg/kg	208	22	10.6	0.062	2.3	0.5	62	4.69	0.80	20	0.91	0.98
23	Residential	PCB	Aroclor-1254	mg/kg	369	17	4.6	0.012	0.7	0.09	0.87	0.235	0.130	11	0.65	0.03
23	Residential	PCB	Aroclor-1260	mg/kg	369	102	27.6	0.012	21	0.21	67	1.12	0.13	38	0.37	0.01
23	Residential	PEST	Dieldrin	mg/kg	45	2	4.4	0.003	0.07	0.004	0.002	0.002	0.002	0	0.00	0.16
23	Residential	PEST	Heptachlor epoxide	mg/kg	46	1	2.2	0.0004	0.035	0.002	0.0009	0.001	0.001	0	0.00	0.16
23	Residential	SVOC	Benzo(a)anthracene	mg/kg	371	112	30.2	0.05	110	0.37	12	0.488	0.068	21	0.19	0.05
23	Residential	SVOC	Benzo(a)pyrene	mg/kg	369	101	27.4	0.05	110	0.33	8.9	0.431	0.083	23	0.23	0.16
23	Residential	SVOC	Benzo(b)fluoranthene	mg/kg	376	115	30.6	0.05	110	0.34	8.8	0.415	0.072	19	0.17	0.17
23	Residential	SVOC	Benzo(k)fluoranthene	mg/kg	366	66	18.0	0.05	110	0.34	5.1	0.335	0.089	14	0.21	0.16
23	Residential	SVOC	Chrysene	mg/kg	371	132	35.6	0.05	110	3.3	13	0.570	0.088	5	0.04	0.01
23	Residential	SVOC	Dibenz(a,h)anthracene	mg/kg	367	37	10.1	0.05	110	0.33	0.95	0.169	0.049	5	0.14	0.17
23	Residential	SVOC	Indeno(1,2,3-cd)pyrene	mg/kg	369	62	16.8	0.05	110	0.35	3.7	0.262	0.064	9	0.15	0.10
23	Residential	SVOC	N-nitroso-di-n-propylamine	mg/kg	48	1	2.1	0.34	110	0.33	0.11	0.110	0.110	0	0.00	1.00
23	Residential	TPH	Total TPH	mg/kg	356	241	67.7	0	0	3,500	211,600	1460	124	8	0.03	0.00
23	Residential	VOC	Naphthalene	mg/kg	369	51	13.8	0.0046	110	1.7	14	0.512	0.026	2	0.04	0.02
24	Residential	METAL	Arsenic	mg/kg	398	312	78.4	0.2	28	11.1	116	10.14	5.20	86	0.28	0.05
24	Residential	METAL	Cadmium	mg/kg	122	38	31.2	0.011	21	3.5	6.6	1.92	1.65	8	0.21	0.06
24	Residential	METAL	Copper	mg/kg	422	422	100.0	0.045	52.2	159	5,550	141	79	98	0.23	All Detected
24	Residential	METAL	Iron	mg/kg	67	67	100.0	1	11.8	58,000	73,100	39648	38900	6	0.09	All Detected
24	Residential	METAL	Lead	mg/kg	135	125	92.6	0.1	12	155	819	34.54	7.00	6	0.05	0.00
24	Residential	METAL	Manganese	mg/kg	486	486	100.0	0.04	180	1,431	55,300	4314	2400	313	0.64	All Detected
24	Residential	METAL	Mercury	mg/kg	250	157	62.8	0.005	10.9	2.28	124	3.14	0.21	12	0.08	0.00
24	Residential	METAL	Thallium	mg/kg	268	44	16.4	0.15	85.8	5	35	6.21	2.65	16	0.36	0.25
24	Residential	METAL	Vanadium	mg/kg	67	67	100.0	0.1	1.1	117	175	90.43	86.40	13	0.19	All Detected
24	Residential	METAL	Zinc	mg/kg	142	142	100.0	0.06	21	373	2,500	127	72	5	0.04	All Detected
24	Residential	ORGPB	Organic Lead	mg/kg	39	2	5.1	0.5	0.93	0.5	7.3	5.60	5.60	2	1.00	0.97
24	Residential	PCB	Aroclor-1260	mg/kg	108	9	8.3	0.012	0.19	0.21	1.5	0.368	0.067	2	0.22	0.00
24	Residential	SVOC	Benzo(a)anthracene	mg/kg	330	56	17.0	0.05	3.7	0.37	1.8	0.205	0.087	9	0.16	0.15
24	Residential	SVOC	Benzo(a)pyrene	mg/kg	330	58	17.6	0.05	3.7	0.33	1.6	0.206	0.093	11	0.19	0.24

TABLE 2-11: SOIL COCs AND TOTAL TPH COMPARISON TO CRITERIA BY REDEVELOPMENT BLOCK (CONTINUED)

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

RB	Reuse Scenario	Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	Minimum Detection Limit	Maximum Detection Limit	Screening Criterion	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Number of Detections Greater than the Screening Criterion	Detects Greater than the Screening Criterion	ND Greater than the Screening Criterion
24	Residential	SVOC	Benzo(b)fluoranthene	mg/kg	330	57	17.3	0.05	3.7	0.34	1.7	0.215	0.100	8	0.14	0.23
24	Residential	SVOC	Benzo(k)fluoranthene	mg/kg	330	41	12.4	0.05	3.7	0.34	1.4	0.185	0.078	8	0.20	0.22
24	Residential	SVOC	Dibenz(a,h)anthracene	mg/kg	330	14	4.2	0.05	3.7	0.33	0.3	0.082	0.055	0	0.00	0.22
24	Residential	TPH	Total TPH	mg/kg	287	130	45.3	0	0	3,500	2,203	146	44	0	0.00	0.00
24	Residential	VOC	Tetrachloroethene	mg/kg	139	12	8.6	0.00352	0.56	0.48	1.7	0.347	0.043	3	0.25	0.00
24	Residential	VOC	Trichloroethene	mg/kg	139	74	53.2	0.00352	1	2.9	17.8	0.661	0.025	5	0.07	0.00
25	Industrial	METAL	Arsenic	mg/kg	128	54	42.2	0.17	10.9	11.1	17.9	3.96	3.60	3	0.06	0.00
25	Industrial	METAL	Lead	mg/kg	132	94	71.2	0.1	2.71	800	939	34.71	8.85	1	0.01	0.00
25	Industrial	SVOC	Benzo(a)pyrene	mg/kg	132	40	30.3	0.069	11	0.33	2	0.234	0.125	8	0.20	0.55
25	Industrial	TPH	Total TPH	mg/kg	149	101	67.8	0	0	3,500	35,005.60	2129	110	17	0.17	0.00
25	Industrial	VOC	Benzene	mg/kg	105	8	7.6	0.00344	28	0.39	1.9	0.332	0.005	2	0.25	0.11
26	Residential	METAL	Cadmium	mg/kg	59	28	47.5	0.04	3.3	3.5	6	2.16	2.00	4	0.14	0.00
26	Residential	METAL	Copper	mg/kg	59	59	100.0	0.04	5.6	159	1,900	110	61	5	0.08	All Detected
26	Residential	METAL	Iron	mg/kg	25	25	100.0	1.4	9.4	58,000	71,000	30508	29300	1	0.04	All Detected
26	Residential	METAL	Manganese	mg/kg	100	100	100.0	0.02	51	1,431	12,000	1539	863	30	0.30	All Detected
26	Residential	METAL	Mercury	mg/kg	25	15	60.0	0.01	0.55	2.28	26	1.86	0.09	1	0.07	0.00
26	Residential	METAL	Thallium	mg/kg	59	17	28.8	0.18	21	5	5.5	1.95	1.20	2	0.12	0.10
26	Residential	METAL	Vanadium	mg/kg	25	25	100.0	0.08	0.89	117	179	73.90	70.70	3	0.12	All Detected
26	Residential	METAL	Zinc	mg/kg	59	58	98.3	0.2	26.9	373	1,320	95.57	63.55	2	0.03	0.00
26	Residential	SVOC	2-Methylnaphthalene	mg/kg	54	8	14.8	0.068	29	145	280	35.34	0.07	1	0.13	0.00
26	Residential	SVOC	Benzo(a)anthracene	mg/kg	94	23	24.5	0.051	3.4	0.37	32	1.65	0.10	6	0.26	0.13
26	Residential	SVOC	Benzo(a)pyrene	mg/kg	93	23	24.7	0.051	3.4	0.33	14	0.803	0.120	6	0.26	0.39
26	Residential	SVOC	Benzo(b)fluoranthene	mg/kg	93	19	20.4	0.051	3.4	0.34	6.4	0.548	0.140	2	0.11	0.34
26	Residential	SVOC	Benzo(k)fluoranthene	mg/kg	93	18	19.4	0.051	3.4	0.34	1.6	0.273	0.170	3	0.17	0.32
26	Residential	SVOC	Chrysene	mg/kg	94	25	26.6	0.051	3.4	3.3	44	2.02	0.12	1	0.04	0.01
26	Residential	SVOC	Dibenz(a,h)anthracene	mg/kg	92	2	2.2	0.051	3.4	0.33	3.4	1.77	1.77	1	0.50	0.33
26	Residential	SVOC	Indeno(1,2,3-cd)pyrene	mg/kg	93	9	9.7	0.051	3.4	0.35	1.7	0.280	0.150	1	0.11	0.23
26	Residential	TPH	Total TPH	mg/kg	97	66	68.0	0	0	3,500	25,600	1101	95	4	0.06	0.00
26	Residential	VOC	Naphthalene	mg/kg	94	9	9.6	0.0065	29	1.7	97	10.91	0.05	1	0.11	0.01
20A	Residential	METAL	Cadmium	mg/kg	107	20	18.7	0.014	5.4	3.5	10.6	2.16	1.20	2	0.10	0.02
20A	Residential	METAL	Copper	mg/kg	119	116	97.5	0.04	9	159	2,700	99.52	37.00	9	0.08	0.00
20A	Residential	METAL	Iron	mg/kg	32	32	100.0	0.97	29	58,000	63,800	36444	35850	3	0.09	All Detected
20A	Residential	METAL	Manganese	mg/kg	147	147	100.0	0.018	11	1,431	8,990	1152	759	31	0.21	All Detected
20A	Residential	METAL	Vanadium	mg/kg	33	33	100.0	0.071	12	117	152	70.08	71.40	3	0.09	All Detected
20A	Residential	METAL	Zinc	mg/kg	121	120	99.2	0.1	210	373	36,000	628	56	23	0.19	0.00
20A	Residential	PCB	Aroclor-1260	mg/kg	43	7	16.3	0.012	0.71	0.21	2.4	0.647	0.510	4	0.57	0.03
20A	Residential	SVOC	Benzo(a)anthracene	mg/kg	125	17	13.6	0.053	12	0.37	1.8	0.268	0.100	3	0.18	0.20
20A	Residential	SVOC	Benzo(a)pyrene	mg/kg	125	17	13.6	0.053	12	0.33	1.2	0.243	0.099	3	0.18	0.30
20A	Residential	SVOC	Benzo(b)fluoranthene	mg/kg	125	18	14.4	0.053	12	0.34	2	0.334	0.120	5	0.28	0.31
20A	Residential	SVOC	Benzo(k)fluoranthene	mg/kg	125	13	10.4	0.053	12	0.34	0.7	0.215	0.086	4	0.31	0.29
20A	Residential	SVOC	Hexachlorobenzene	mg/kg	32	1	3.1	0.35	12	0.33	0.082	0.082	0.082	0	0.00	1.00
20A	Residential	SVOC	Indeno(1,2,3-cd)pyrene	mg/kg	125	11	8.8	0.053	12	0.35	0.63	0.179	0.077	2	0.18	0.28
20A	Residential	TPH	Total TPH	mg/kg	56	23	41.1	0	0	3,500	4,400	315	29	1	0.04	0.00
20A	Residential	VOC	1,4-Dichlorobenzene	mg/kg	80	4	5.0	0.0044	12	2	19	5.44	0.98	1	0.25	0.01
20A	Residential	VOC	Tetrachloroethene	mg/kg	137	27	19.7	0.0043	1.1	0.48	1.5	0.104	0.008	2	0.07	0.05
20A	Residential	VOC	Trichloroethene	mg/kg	137	80	58.4	0.0043	1.1	2.9	36	2.85	0.03	11	0.14	0.00
20B	Industrial	METAL	Arsenic	mg/kg	75	63	84.0	0.18	3	11.1	245	9.84	3.20	8	0.13	0.00
20B	Industrial	METAL	Lead	mg/kg	57	54	94.7	0.13	6.4	800	580	56.82	12.10	0	0.00	0.00
20B	Industrial	PCB	Aroclor-1260	mg/kg	73	27	37.0	0.013	77	1	270	39.45	0.95	13	0.48	0.00

TABLE 2-11: SOIL COCS AND TOTAL TPH COMPARISON TO CRITERIA BY REDEVELOPMENT BLOCK (CONTINUED)

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

RB	Reuse Scenario	Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	Minimum Detection Limit	Maximum Detection Limit	Screening Criterion	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Number of Detections Greater than the Screening Criterion	Detects Greater than the Screening Criterion	ND Greater than the Screening Criterion
20B	Industrial	SVOC	Benzo(a)anthracene	mg/kg	59	19	32.2	0.053	42	1.8	0.66	0.169	0.100	0	0.00	0.08
20B	Industrial	SVOC	Benzo(a)pyrene	mg/kg	59	20	33.9	0.053	42	0.33	0.67	0.171	0.115	3	0.15	0.79
20B	Industrial	SVOC	Benzo(b)fluoranthene	mg/kg	59	20	33.9	0.053	42	1.8	0.85	0.222	0.185	0	0.00	0.10
20B	Industrial	SVOC	Benzo(k)fluoranthene	mg/kg	58	10	17.2	0.053	42	1.8	0.34	0.140	0.130	0	0.00	0.08
20B	Industrial	SVOC	Indeno(1,2,3-cd)pyrene	mg/kg	58	8	13.8	0.053	42	1.8	0.24	0.138	0.115	0	0.00	0.08
20B	Industrial	TPH	Total TPH	mg/kg	115	83	72.2	0	0	3,500	11,000	1165	89	12	0.14	0.00
20B	Industrial	VOC	1,4-Dichlorobenzene	mg/kg	66	13	19.7	0.0022	42	4.5	34.2	7.19	1.42	5	0.38	0.04
20B	Industrial	VOC	Trichloroethene	mg/kg	64	4	6.3	0.0022	2.8	6.6	0.013	0.004	0.002	0	0.00	0.00
CMI-1	Industrial	METAL	Arsenic	mg/kg	44	28	63.6	0.2	3.2	11.1	89	7.04	3.50	1	0.04	0.00
CMI-1	Industrial	SVOC	Benzo(a)anthracene	mg/kg	31	5	16.1	0.073	3.7	1.8	30	6.18	0.18	1	0.20	0.04
CMI-1	Industrial	SVOC	Benzo(a)pyrene	mg/kg	31	4	12.9	0.073	3.7	0.33	27	6.94	0.32	2	0.50	0.93
CMI-1	Industrial	SVOC	Benzo(b)fluoranthene	mg/kg	31	4	12.9	0.073	3.7	1.8	27	6.92	0.31	1	0.25	0.04
CMI-1	Industrial	SVOC	Benzo(k)fluoranthene	mg/kg	31	3	9.7	0.073	3.7	1.8	6.5	2.33	0.34	1	0.33	0.04
CMI-1	Industrial	SVOC	Chrysene	mg/kg	31	6	19.4	0.073	3.7	18	37	6.35	0.25	1	0.17	0.00
CMI-1	Industrial	SVOC	Dibenz(a,h)anthracene	mg/kg	31	1	3.2	0.073	3.7	0.33	3.9	3.90	3.90	1	1.00	0.90
CMI-1	Industrial	SVOC	Indeno(1,2,3-cd)pyrene	mg/kg	31	2	6.5	0.073	3.7	1.8	14	7.18	7.18	1	0.50	0.03
CMI-1	Industrial	TPH	Total TPH	mg/kg	45	24	53.3	0	0	3,500	6,500.56	723	82	1	0.04	0.00
COS-1	Recreational	SVOC	Benzo(a)pyrene	mg/kg	6	1	16.7	0.072	110	0.33	0.032	0.032	0.032	0	0.00	1.00
COS-1	Recreational	TPH	Total TPH	mg/kg	5	2	40.0	0	0	3,500	280	172	172	0	0.00	0.00
COS-2	Recreational	METAL	Arsenic	mg/kg	147	95	64.6	0.18	2.6	11.1	43.1	6.91	4.00	16	0.17	0.00
COS-2	Recreational	METAL	Lead	mg/kg	61	51	83.6	0.1	6.3	155	420	63.67	15.90	6	0.12	0.00
COS-2	Recreational	SVOC	Benzo(a)pyrene	mg/kg	163	65	39.9	0.051	1.9	0.33	1	0.184	0.100	10	0.15	0.39
COS-2	Recreational	TPH	Total TPH	mg/kg	186	124	66.7	0	0	3,500	2,540	277	88	0	0.00	0.00
COS-3	Recreational	METAL	Arsenic	mg/kg	43	30	69.8	0.2	2.8	11.1	20.3	5.07	4.45	3	0.10	0.00
COS-3	Recreational	SVOC	Benzo(a)pyrene	mg/kg	84	14	16.7	0.052	11	0.33	3.6	0.585	0.120	5	0.36	0.54
COS-3	Recreational	TPH	Total TPH	mg/kg	90	61	67.8	0	0	3,500	10,630.39	947	134	5	0.08	0.00

Notes: This table includes soil analytical data collected at Parcel C from 0 to 10 feet bgs. Samples that have been excavated or otherwise removed were excluded from this data set.
Data are included for those chemicals determined to be COCs by the Parcel C human health risk assessment (seeSection 3.0) based on planned reuse at each redevelopment block.
COCs are compared with remediation goals, which are developed in Section 4.0. Total TPH is compared with the cleanup goal developed under the TPH program.

bgs Below ground surface
BHC Benzene hexachloride
CMI Parcel C maritime/industrial
COC Chemical of concern
COS Parcel C open space
mg/kg Milligram per kilogram
ND Not detected
ORGPB Organic lead
PCB Polychlorinated biphenyl
PEST Pesticide
RB Redevelopment block
SVOC Semivolatile organic compound
TPH Total petroleum hydrocarbons
VOC Volatile organic compound

TABLE 2-12: REDEVELOPMENT BLOCK INFORMATION SUMMARY
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block Background	Source of Contamination	HHRA Chemical of Concern	Historical Response Actions	Response Action Recommended
CMI-1				
Features: Upland portion of Dry Dock 4; two piers containing Berths 6 through 11; Buildings 238, 300, 301, and 367; former hazardous waste accumulation area; exploratory excavation sites EE-06 and EE-07 **Acreage:** 13.7 **Reuse:** Maritime/industrial **IR Sites:** Part of IR-57	Batteries, transformers, ship repair and maintenance activities, and hazardous waste accumulation area	Arsenic, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene	• 1997 Exploratory Excavations – 19 cy of soil containing metals and TPH removed from EE-06 (IT Corp. 1999) • 2001 Dry Dock 4 Removal Action – Sediments encapsulated within Dry Dock 4 drainage culvert (Tetra Tech 2003a)	Yes
COS-1				
Features: Building 135, portion of Building 206 **Acreage:** 3.5 **Reuse:** Open space **IR Sites:** Part of IR-64	Electrical equipment	Benzo(a)pyrene (below PQL)	None	Yes
COS-2				
Features: Building 218, portion of Building 231, Berth 1; Building 231 contains sumps and is adjacent to the former locations of USTs HPA-10, HPA-11, HPA-12, HPA-16, and HPA-17 **Acreage:** 3.9 **Reuse:** Open space **IR Sites:** Part of IR-28	Sandblasting operations, former USTs, machining operations, and oil-soaked floor	Arsenic, lead, and benzo(a)pyrene	• 1991 to 1993 Phase I and Phase II UST Removals and Closures – USTs HPA-10, HPA-11, and HPA-17 removed; USTs HPA-12 and HPA-16 closed in place (PRC 1994) • 2001 to 2002 Parcel C TCRA – 3,900 cy of soil containing metals, PAHs, TPH removed (Tetra Tech 2002a)	Yes

TABLE 2-12: REDEVELOPMENT BLOCK INFORMATION SUMMARY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block Background	Source of Contamination	HHRA Chemical of Concern	Historical Response Actions	Response Action Recommended
COS-3				
Features: Buildings 225, 226, 229, and portions of Buildings 211, 219, and 224; Berths 2 through 4; former location of UST HPA-01; and EE-08; a sump is located on the north exterior of Building 219 **Acreage:** 7.8 **Reuse:** Open space **IR Sites:** Part of IR-28	UST, machining and welding operations, transformers, and electrical equipment	Arsenic and benzo(a)pyrene	• 1991 to 1993 Phase I and Phase II UST Removals and Closures – UST HPA-01 removed (PRC 1994) • 1997 Exploratory Excavations – 93 cy of soil containing metals and TPH removed from EE-08 (IT Corp. 1999)	Yes
RB-10				
Features: Contains sites of demolished Buildings 111 and 112, former tank farm (18 ASTs) **Acreage:** 2.9 **Reuse:** Mixed use **IR Sites:** Part of IR-06	ASTs, fuel distribution lines, and sandblast waste used during berm construction	Antimony, arsenic, iron, lead, manganese, nickel, Aroclor-1260, dieldrin, gamma-BHC, heptachlor epoxide, 3,3'-dichlorobenzidine, benzo(a)anthracene. benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-CD) pyrene, naphthalene, and PCE	• IR-06 Tank Farm Removal (HLA 1994c; IT Corp. 1998, 2001a; PRC 1994, 1996; Tetra Tech 2001, Tetra Tech and Washington Group International 2002) – Prior to 1993 – eight ASTs removed – 1993 – removed all remaining ASTs, support racks, piping within bermed areas, and pump houses –T PH CAP – more than 6,000 cy of soil removed	Yes

TABLE 2-12: REDEVELOPMENT BLOCK INFORMATION SUMMARY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block Background	Source of Contamination	HHRA Chemical of Concern	Historical Response Actions	Response Action Recommended
RB-11				
Features: Contains Building 134, demolished site of Building 124 **Acreage:** 2.8 **Reuse:** Mixed use **IR Sites:** Part of IR-25	Dip tanks, sumps, metal parts cleaning, former fuel lines, acid mixing operations, and industrial laboratory activities	Copper; iron, manganese, Aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a;h)anthracene, indeno(1,2,3-cd)pyrene, 1,2-DCA, 1,4-DCB, naphthalene; PCE, TCE, and vinyl chloride	• 2001 to 2002 Parcel C TCRA – 17 cy of soil containing metals, Aroclor-1260, petroleum hydrocarbons excavated (Tetra Tech 2002a)	Yes
RB-13				
Features: No buildings or structures, site of former scrap yard, and site of EE-11 **Acreage:** 1.8 **Reuse:** Mixed use **IR Sites:** Part of IR-58	Scrap yard used to store miscellaneous equipment, electrical equipment, drums, and motors	Iron, manganese, vanadium, and dieldrin	• 1997 Exploratory Excavations – 17 cy of soil containing mercury and PCBs removed from EE-11 (IT Corp. 1999) • 2001 to 2002 Parcel C TCRA – 102 cy of soil containing metals and PAHs removed (Tetra Tech 2002a)	Yes
RB-18				
Features: Buildings 154, 217, 241, and 280; sites of demolished Buildings 278 and 297; and site of EE-10 **Acreage:** 4.6 **Reuse:** Research and development **IR Sites:** Part of IR-29, IR-30, IR-63	Metalworking activities, dip tanks, and transformer	Arsenic, manganese, vanadium, gamma-BHC, heptachlor epoxide B, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, and benzene	• 1997 Exploratory Excavations – 14 cy of soil containing thallium and TPH removed from EE-10 (IT Corp. 1999) • 2001 to 2002 Parcel C TCRA – 1,900 cy of soil containing metals, VOCs, PAHs, PCBs, and TPH removed (Tetra Tech 2002a)	Yes

TABLE 2-12: REDEVELOPMENT BLOCK INFORMATION SUMMARY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block Background	Source of Contamination	HHRA Chemical of Concern	Historical Response Actions	Response Action Recommended
RB-20A				
Features: Building 258, 11 concrete and metal dip tanks and associated drainage sumps **Acreage:** 1.8 **Reuse:** Research and development **IR Sites:** Part of IR-28	Machining and plating operations, ASTs, and plating and pipe manufacturing and fitting activities. Sulfuric, chromic, and hydrochloric acids, sodium hydroxide, and degreasing solvents were used in pickling and degreasing operation	Cadmium, copper, iron, manganese, vanadium, zinc, Aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, hexachlorobenzene, indeno(1,2,3-cd)pyrene, 1,4-DCB, PCE, and TCE	• 2001 to 2002 Parcel C TCRA – 28 cy of soil containing metals and Aroclor-1260 (Tetra Tech 2002a)	Yes
RB-20B				
Features: Buildings 214, 251, and 252; Building 251 contains dip tanks and sumps and is the former location of two USTs (S-219 and S-251) **Acreage:** 3.1 **Reuse:** Educational and cultural **IR Sites:** Part of IR-28	Former USTs and AST, painting operations using paints and solvents, and machining and plating operations using acids and metals	Arsenic, lead, Aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, 1,4-DCB, and TCE[a]	• 1991 to 1993 Phase I and Phase II UST Removals and Closures – UST S-251 and UST S-219 removed (PRC 1994) • 2004 TPH CA – 51 cy of soil containing TPH removed (TPA-CKY 2005) • 2001 Soil Vapor Extraction Study at Building 251 (IT Corp. 2002a)	Yes

TABLE 2-12: REDEVELOPMENT BLOCK INFORMATION SUMMARY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block Background	Source of Contamination	HHRA Chemical of Concern	Historical Response Actions	Response Action Recommended
RB-22				
Features: Dry Docks 2 and 3; Buildings 204, 205, 207, and 208; eastern portion of Building 206; western portion of Building 231; and former location of two USTs (HPA-06 and S-214) associated with Building 205 **Acreage:** 5.8 **Reuse:** Educational and cultural **IR Sites:** Part of IR-27, IR-28, IR-64	Sandblasting operations; former USTs and ASTs; machining operations; electrical equipment; ship building/repair activities, and metalworking	Arsenic, lead, organic lead, benzo(a)pyrene, PCE, and vinyl chloride	• 1991 to 1993 Phase I and Phase II UST Removals and Closures – UST S-214 and HPA-06 removed (PRC 1994) • 2002 Parcel C TCRA – 22 cy soil containing metals and 80 cy of soil containing SVOCs removed from locations near Building 231 (Tetra Tech 2002a) • 2001 Soil Vapor Extraction Study at Building 231 (IT Corp. 2002b)	Yes
RB-23				
Features: Buildings 203, 215, 275, and 282; former Building S-211; former locations of ASTs S-203-1a through 203-7; six USTs (S-203, S-209, S-210, S-211, S-212, and S-213) and associated fuel lines were formerly located adjacent to Building 203 **Acreage:** 3.3 **Reuse:** Research and development **IR Sites:** Part of IR-29	ASTs and USTs, metalworking activities, abrasive blast activities, and transformers	Arsenic, cadmium, copper, iron, lead, manganese, mercury, thallium, vanadium, zinc, organic lead, Aroclor-1254, Aroclor-1260, dieldrin, heptachlor epoxide, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-CD)pyrene, n-nitroso-di-n-propylamine, and naphthalene	• 1991 to 1993 Phase I and Phase II UST Removals – UST S-203, and USTs S-211 through S-213 removed (PRC 1994) • 2002 Parcel C TCRA – 825 cy of soil containing metals, PAHs, and PCBs; 49 cy of soil containing metals; and 40 cy of soil containing PCBs removed from locations adjacent to Building 203 (Tetra Tech 2002a)	Yes

TABLE 2-12: REDEVELOPMENT BLOCK INFORMATION SUMMARY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block Background	Source of Contamination	HHRA Chemical of Concern	Historical Response Actions	Response Action Recommended
RB-24				
Features: Buildings 228, 270, 271, 272, 273, and 281; the site of EE-09; UST S-215 was formerly located adjacent to Building 270; Building 271 contains a metal shed; Building 281 contains sumps, dip tanks, and a vault/pit; three USTs (HPA-07, HPA-33, and HPA-37) were formerly located adjacent to Building 281 **Acreage:** 5.6 **Reuse:** Research and development **IR Sites:** Part of IR-28	Former ASTs and USTs, sandblasting, painting, machining, metal casting, dip tanks, and oil staining. The shed was previously used as a sandblasting room and to store sand, oxidizers, degreasers, and detergents	Arsenic, cadmium, copper, iron, lead, manganese, mercury, thallium, vanadium, zinc, organic lead, Aroclor-1260, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, PCE, and TCE	• 1991 to 1993 Phase I and Phase II UST Removals and Closures – UST S-215 closed in place, and USTs HPA-07, HPA-33, and HPA-34 removed (PRC 1994) • 1997 Exploratory Excavations – 309 cy of soil containing metals, SVOCs, and TPH removed from EE-09 (IT Corp. 1999) • 2002 Parcel C TCRA – 1,400 cy of soil containing metals, PAHs, and PCBs removed from 11 areas (Tetra Tech 2002a)	Yes
RB-25				
Features: Western portions of Buildings 211 and 224; Building 253; former location of eight USTs (HPA-02 through HPA-05 and S-001 through S-004) and collection sumps associated with Building 253 **Acreage:** 3.3 **Reuse:** Educational and cultural **IR Sites:** Part of IR-28	Former USTs and ASTs, machining, welding, and painting operations	Arsenic, lead, benzo(a)pyrene, and benzene	• 1991 to 1993 Phase I and Phase II UST Removals and Closures – USTs S-001 through S-004 and USTs HPA-002 through HPA-005 removed (PRC 1994) • 2002 Parcel C TCRA – 66 cy of soil containing metals and SVOCs removed (Tetra Tech 2002a)	Yes

TABLE 2-12: REDEVELOPMENT BLOCK INFORMATION SUMMARY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Redevelopment Block Background	Source of Contamination	HHRA Chemical of Concern	Historical Response Actions	Response Action Recommended
RB-26				
Features: Buildings 230, 235, 236; closed-in-place USTs S-209, S-210 **Acreage:** 2.9 **Reuse:** Mixed use **IR Sites:** Part of IR-28, IR-29, IR--57	Machine shop activities; painting; former ASTs and USTs	Cadmium, copper, iron, manganese, mercury, thallium, vanadium, zinc, 2-methylnaphthalene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene. indeno(1,2,3-CD)pyrene, and naphthalene	• 1991 to 1993 Phase I and Phase II UST Removals and Closures – USTs S-209 and S-10 closed in place (PRC 1994) • 2001, 2002 Parcel C TCRA – 800 yd^3 of soil containing metals, PAHs and PCBs removed (Tetra Tech 2002a)	Yes

Notes:

a The HHRA lists TCE as a COC in risk grid AY11. Risk grid AY11 overlaps RB-20A and RB-20B; therefore, TCE is included in both RB-20A and RB-20B in this table although it only occurs in RB-20B (PRC, Levine-Fricke-Recon, Inc., and Uribe & Associates, 1997).

AST	Aboveground storage tank	PAH	Polycyclic aromatic hydrocarbon
BHC	Benzene hexachloride	PCB	Polychlorinated biphenyl
CA	Corrective action	PCE	Tetrachloroethene
CAP	Corrective action plan	PQL	Practical quantitation limit
COC	Chemical of concern	PRC	PRC Environmental Management, Inc.
cy	Cubic yard	RB	Redevelopment block
DCA	Dichloroethane	SVOC	Semivolatile organic compound
DCB	Dichlorobenzene	TCE	Trichloroethene
EE	Exploratory excavation	TCRA	Time-critical removal action
HHRA	Human health risk assessment	Tetra Tech	Tetra Tech EM Inc.
HLA	Harding Lawson Associates	TPH	Total petroleum hydrocarbons
IR	Installation Restoration	UST	Underground storage tank
IT Corp.	International Technology Corporation	VOC	Volatile organic compound

Sources:

HLA. 1994c. "Draft Final Construction Summary Report, Tank Farm Removal Action, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California." October 3.
IT Corp. 1998. "Draft Project Completion Report, Tank Farm Excavations. Hunters Point Shipyard, San Francisco, California." February.
IT Corp. 1999. "Final Draft Completion Report, HPS Exploratory Excavations, San Francisco, California." June.
IT Corp. 2001a. "Final Tank Closure Report, Aboveground/Underground Tank Cleaning and Removal, Hunters Point Shipyard, San Francisco, California." December 10.
IT Corp. 2002a. "Draft Phase II Soil Vapor Extraction Treatability Study Report, Building 123, IR-10, Parcel B, Hunters Point Shipyard, San Francisco, California." February 14.
IT Corp. 2002b. "Draft Phase II Soil Vapor Extraction Treatability Study Report, Building 251, IR-28, Parcel C, Hunters Point Shipyard, San Francisco, California." April 22.

TABLE 2-12: REDEVELOPMENT BLOCK INFORMATION SUMMARY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Sources (Continued):

PRC. 1994. "Draft Summary Report of Phase I and Phase II UST Removals and Closures in Place, NAVSTA TI, HPA, San Francisco, California." July 12.

PRC. 1996. "Final Excavation Plan, IR-06 Tank Farm, Hunters Point Shipyard, San Francisco, California." December 19.

PRC, Levine-Fricke-Recon, Inc., and Uribe & Associates. 1997. "Draft Final Parcel C Remedial Investigation Report, Hunters Point Shipyard, San Francisco, California." March 13.

Tetra Tech. 2001. "Final Petroleum Hydrocarbon Corrective Action Plan, Parcel B, Hunters Point Shipyard, San Francisco, California." January 10.

Tetra Tech. 2002a. "Parcel C Time-Critical Removal Action Closeout Report, Hunters Point Shipyard, San Francisco, California." July.

Tetra Tech. 2003a. "Final Emergency Removal Action Closeout Report, Encapsulation of Drainage Culvert Sediment at Dry Dock 4 Installation Restoration Site 57, Parcel C, Hunters Point Shipyard, San Francisco, California." February 20.

Tetra Tech and Washington Group International. 2002. "Final Parcel C Time-Critical Removal Action." July 12.

TPA-CKY 2005. "Draft Final Site Close Out Report Total Petroleum Hydrocarbon Program Corrective Action Implementation Plan Soil Removal for Parcels B, C, D, and E, Hunters Point Shipyard, San Francisco, California." June.

TABLE 2-13: PARCEL C GROUNDWATER MONITORING WELLS

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Plume Designation	Monitoring Well	Water-Bearing Unit for HHRA
RU-C1 plume	IR28MW268A	A
	IR28MW126A	A
	IR28MW127A	A
	IR28MW255F	B
	PA28MW52A	A
	IR28MW169A	A
	IR28MW125A	A
	IR28MW324A	A
	PA28MW51A	A
	IR28MW401B	B
	IR28MW128A	A
	IR28MW129A	A
	IR28MW155A	A
	IR28MW149A	A
	IR28MW309B	B
	IR28MW326A	A
	IR28MW333A	A
	IR28MW335A	A
	IR28MW327A	A
	IR28MW330A	A
	IR28MW331A	A
	IR28MW337A	A
	IR28MW136A	A
	IR28MW314B	A
	IR28MW328A	A
	IR28MW329A	A
	IR28MW334A	A
	IR28MW338A	A
	IR28MW336A	A
	IR28MW339A	A
	IR28MW399B	B
	IR28MW354A	A
	IR28MW173B	B
	IR28MW930A	A
	IR28MW151A	A
	IR28MW916A	A
	IR28MW918A	A
	IR28MW919A	A
	IR28MW921A	A
	IR28MW920A	A
	IR28MW171B	B
	IR28MW124A	A
	PA28MW50A	A
	IR28MW340A	A
	IR28MW170A	A
	IR28MW400B	A
	IR28MW150A	A
	IR28MW353A	A

TABLE 2-13: PARCEL C GROUNDWATER MONITORING WELLS (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Plume Designation	Monitoring Well	Water-Bearing Unit for HHRA
RU-C1 plume	IR28MW353B	B
	IR28MW171A	A
	IR28MW122A	A
	IR28MW270A	A
	IR28MW123A	A
RU-C2 plume	IR28MW188F	A
	IR58MW26A	A
	IR28MW189F	A
	IR28MW909A	A
	IR28MW911A	A
	IR28MW912A	A
	IR28MW913A	A
	IR58MW31A	A
	IR58MW33B	A
	IR58MW35A	A
	IR28MW910A	B
	IR58MW31F	F-WBZ
	IR58MW32B	A
	IR28MW287A	A
	IR28MW397A	A
	IR28MW397B	B
	IR58MW34A	A
	IR28MW914A	B
	IR28MW299B	A
	IR28MW300F	A
	IR28MW190F	A
	IR28MW286A	A
	IR28MW217A	A
	IR28MW395F	F-WBZ
	IR28MW396A	A
	IR28MW396B	B
RU-C4 plume	IR30MW01F	A
	IR30MW02F	A
	IR30MW03F	A
	IR29MW72F	A
	IR30MW04F	A
	IR29MW85F	A
	PA50MW04A	A
	IR28MW406	A
	IR29MW57A	A
	IR29MW58F	A
	IR28MW407	A
	IR28MW408	A
	IR28MW409	A
	IR28MW311A	A
	IR28MW310F	F-WBZ
	IR28MW393F	F-WBZ
	IR28MW402F	F-WBZ

TABLE 2-13: PARCEL C GROUNDWATER MONITORING WELLS (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Plume Designation	Monitoring Well	Water-Bearing Unit for HHRA
RU-C4 plume	IR28MW352A	A
	IR28MW211F	A
	IR28MW275F	A
	IR28MW341F	A
	IR28MW342F	A
	IR28MW351F	A
	IR28MW934F1	A
	IR28MW934F2	A
	IR28MW934F3	A
	IR28MW935F	A
	IR28MW936F	A
	IR28MW937F	A
	IR28MW932F	F-WBZ
	IR28MW934F4	F-WBZ
	IR28MW934F5	F-WBZ
	IR28MW273F	A
	IR28MW405	A
	IR28MW358F	A
	IR28MW403	A
	IR28MW933F1	A
	IR28MW933F2	A
	IR28MW933F3	A
	IR28MW933F4	F-WBZ
	IR28MW933F5	F-WBZ
	IR28MW404	A
	IR29MW56F	A
	IR28MW394A	A
	IR28MW315B	B
	IR28MW315F	F-WBZ
	IR28MW312F	A
	IR28MW298A	A
	IR28MW394B	B
	IR28MW200A	A
	IR28MW201F	F-WBZ
	IR28MW272A	A
	IR28MW272F	F-WBZ
	IR28MW293A	A
	IR28MW294A	A
	IR28MW295A	A
	IR28MW297A	A
RU-C5 plume	IR10MW14A	A
	IR25MW37A	A
	IR25MW37B	A
	IR06MW35A	A
	IR06MW52F	A
	IR06MW22A	A
	IR06MW48F	A
	IR24MW04A	A

TABLE 2-13: PARCEL C GROUNDWATER MONITORING WELLS (CONTINUED)

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Plume Designation	Monitoring Well	Water-Bearing Unit for HHRA
RU-C5 plume	IR25MW38B	A
	IR25MW61A1	A
	IR25MW61A2	A
	IR25MW60A1	A
	IR25MW60A2	A
	IR06MW44A	A
	IR25MW42B	A
	IR25MW17A	A
	IR25MW15A1	A
	IR25MW15A2	A
	IR25MW15F	A
	IR25MW18A	A
	IR25MW19A	A
	IR25MW20A	A
	IR25MW51A	A
	IR25MW900B	A
	IR25MW901B	A
	IR25MW902B	A
	IR25MW903B	A
	IR25MW904B	A
	IR25MW905B	A
	IR25MW52A	A
	IR25MW39A	A
	IR25MW39B	A
	IR06MW40A	A
	IR06MW47F	A
	IR25MW11A	A
	IR25MW22A	A
	IR06MW41A	A
	IR25MW40A	A
	IR06MW59A1	A
	IR06MW59A2	A
	IR06MW22AD	A
	IR06MW30A	A
	IR06MW51F	A
	IR06MW23A	A
	IR06MW32A	A
	IR06MW32AD	A
	IR20MW17A	A
	IR06MW45A	A
	IR25MW41A	A
	IR25MW16A	A
	IR06MW34A	A
	IR06MW42A	A
	IR06MW49F	A
	IR25MW50A	A

TABLE 2-13: PARCEL C GROUNDWATER MONITORING WELLS (CONTINUED)

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Plume Designation	Monitoring Well	Water-Bearing Unit for HHRA
Nonplume	IR06MW53F	A
	IR06MW54F	A
	IR06MW27A	A
	IR06MW50F	A
	IR06MW55F	A
	IR06MW58F	A
	IR06MW56F	A
	IR06MW57F	A
	IR58MW24F	A
	IR28MW313F	F-WBZ
	IR58MW25F	A
	IR50MW13F	A
	IR64MW05A	A
	IR28MW216F	A
	IR28MW350F	F-WBZ
	IR28MW398A	A
	IR28MW398B	B
	IR28MW308A	A
	IR28MW172F	F-WBZ
	IR28MW315A	A
	IR29MW48A	A
	IR28MW290A	A
	IR28MW221A	A
	IR28MW221B	B
	IR29MW59F	A
	IR29MW84A	A
	IR28MW269A	A
	IR28MW140F	F-WBZ
	PA50MW03A	A
	IR28MW271A	A

Notes:

F-WBZ Bedrock water-bearing zone

HHRA Human health risk assessment

RU Remedial Unit

TABLE 2-14: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, A-AQUIFER

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Parcel C Residential RBC Vapor Intrusion	Parcel C Industrial RBC Vapor Intrusion	Surface Water Criteria	Laboratory PQL	Minimum Detected Concentration	Maximum Detected Concentration	Location(s) for Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Parcel C Residential RBC Vapor Intrusion	Detects Greater than Parcel C Industrial RBC Vapor Intrusion	Detects Greater than Surface Water Criteria	Detects Greater than Laboratory PQL
CHROM	Chromium VI	µg/L	266	26	9.77	NA	NA	NA	50	NA	5	260	IR28MW125A (15-AUG-2000)	86	91	61	NA	NA	NA	0.65	NA
METAL	Aluminum	µg/L	335	37	11.04	NA	NA	NA	NA	NA	15.7	26,300	IR28MW294A (17-NOV-1995)	1,085	83	4,284	NA	NA	NA	NA	NA
METAL	Antimony	µg/L	332	37	11.14	43.26	NA	NA	NA	NA	0.21	40.1	IR06MW44A (07-JAN-1992)	10	5	10	0.00	NA	NA	NA	NA
METAL	Arsenic	µg/L	403	166	41.19	27.34	NA	NA	36	NA	1.2	27.6	PA28MW52A (13-DEC-1995)	6	4	5	0.01	NA	NA	0.00	NA
METAL	Barium	µg/L	332	314	94.58	504.2	NA	NA	NA	NA	3.8	929	IR06MW41A (08-JAN-1992)	128	75	151	0.04	NA	NA	NA	NA
METAL	Beryllium	µg/L	386	16	4.15	1.4	NA	NA	NA	NA	0.2	1.1	IR06MW45A (11-OCT-2000)	1	0	0	0.00	NA	NA	NA	NA
METAL	Cadmium	µg/L	337	20	5.93	5.08	NA	NA	8.8	NA	0.26	9.2	IR06MW53F (11-AUG-1994)	2	1	2	0.15	NA	NA	0.05	NA
METAL	Calcium	µg/L	445	426	95.73	NA	NA	NA	NA	NA	2,220	730,000	IR29MW56F (22-JUN-1995)	94,947	56,900	104,516	NA	NA	NA	NA	NA
METAL	Chromium	µg/L	405	108	26.67	15.66	NA	NA	50	8	0.74	1,200	IR28MW920A (28-AUG-2001)	63	11	149	0.44	NA	NA	0.31	0.56
METAL	Cobalt	µg/L	332	127	38.25	20.8	NA	NA	NA	NA	0.41	98.4	IR25MW15A2 (26-MAY-1995)	6	2	11	0.04	NA	NA	NA	NA
METAL	Copper	µg/L	337	84	24.93	28.04	NA	NA	3.1	NA	1.1	270	IR28MW170A (11-JUL-2002)	17	5	34	0.17	NA	NA	0.79	NA
METAL	Iron	µg/L	499	213	42.69	2,380	NA	NA	NA	NA	8.5	550,000	IR25MW19A (29-JAN-1998)	6,143	468	38,760	0.29	NA	NA	NA	NA
METAL	Lead	µg/L	331	24	7.25	14.44	NA	NA	5.6	NA	0.79	29.7	IR28MW127A (27-NOV-1995)	7	4	8	0.13	NA	NA	0.33	NA
METAL	Magnesium	µg/L	448	447	99.78	1,440,000	NA	NA	NA	NA	2,950	1,150,000	IR25MW17A (14-JUN-2002)	317,426	234,000	283,448	0.00	NA	NA	NA	NA
METAL	Manganese	µg/L	381	339	88.98	8,140	NA	NA	NA	NA	0.69	10,500	IR28MW311A (28-MAY-1996)	1,221	366	2,055	0.02	NA	NA	NA	NA
METAL	Mercury	µg/L	417	60	14.39	0.6	NA	NA	0.025	NA	0.046	54	IR28MW170A (23-JAN-2001)	2	0	7	0.35	NA	NA	1.00	NA
METAL	Molybdenum	µg/L	308	77	25.00	61.9	NA	NA	NA	NA	0.95	360	IR30MW01F (12-JUL-2002)	38	7	73	0.17	NA	NA	NA	NA
METAL	Nickel	µg/L	341	175	51.32	96.48	NA	NA	8.2	NA	1.4	384	IR28MW294A (17-NOV-1995)	31	15	47	0.05	NA	NA	0.67	NA
METAL	Potassium	µg/L	448	430	95.98	448,000	NA	NA	NA	NA	258	710,000	IR28MW920A (28-AUG-2001)	79,126	33,800	112,187	0.01	NA	NA	NA	NA
METAL	Selenium	µg/L	329	45	13.68	14.5	NA	NA	71	NA	2.2	64.2	IR06MW45A (30-MAR-2004)	11	4	13	0.22	NA	NA	0.00	NA
METAL	Silver	µg/L	331	10	3.02	7.43	NA	NA	0.38	NA	0.55	24.1	IR28MW314B (03-JUL-1996)	4	1	7	0.10	NA	NA	1.00	NA
METAL	Sodium	µg/L	448	446	99.55	9,242,000	NA	NA	NA	NA	980	9,700,000	IR28MW123A (18-MAY-1994)	1,629,632	712,500	2,176,934	0.01	NA	NA	NA	NA
METAL	Thallium	µg/L	327	39	11.93	12.97	NA	NA	426	NA	0.103	52.7	IR25MW17A (14-JUN-2002)	7	4	9	0.08	NA	NA	0.00	NA
METAL	Vanadium	µg/L	329	189	57.45	26.62	NA	NA	NA	NA	0.55	71.6	IR28MW294A (17-NOV-1995)	6	4	8	0.02	NA	NA	NA	NA
METAL	Zinc	µg/L	337	97	28.78	75.68	NA	NA	81	10	3	1,300	IR28MW170A (11-JUL-2002)	56	21	140	0.14	NA	NA	0.13	0.81
VOC	1,1,1,2-Tetrachloroethane	µg/L	382	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	1,1,1-Trichloroethane	µg/L	1,067	8	0.75	NA	3,100	3,100	6,240	NA	0.14	720	IR25MW15A1 (13-JUN-1994)	99	5	235	NA	0.00	0.00	0.00	NA
VOC	1,1,2,2-Tetrachloroethane	µg/L	1,067	2	0.19	NA	3	5.1	1,804	0.5	6	120	IR28MW211F (13-NOV-2002)	63	63	57	NA	1.00	1.00	0.00	1.00
VOC	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	469	47	10.02	NA	1,300	1,300	NA	NA	0.14	140	IR25MW52A (17-JUN-2002)	14	1	27	NA	0.00	0.00	NA	NA
VOC	1,1,2-Trichloroethane	µg/L	1,067	34	3.19	NA	4	6.7	NA	0.5	0.2	170	IR28MW211F (09-JUL-2002)	24	3	39	NA	0.41	0.41	NA	0.91
VOC	1,1-Dichloroethane	µg/L	1,067	59	5.53	NA	6.5	11	NA	0.5	0.17	38	IR28MW916A (23-JAN-2001)	5	1	10	NA	0.17	0.14	NA	0.54
VOC	1,1-Dichloroethene	µg/L	1,067	72	6.75	NA	190	190	44,800	NA	0.14	42	IR25MW15A1 (11-JAN-2001)	4	1	7	NA	0.00	0.00	0.00	NA
VOC	1,1-Dichloropropene	µg/L	207	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	1,2,3-Trichlorobenzene	µg/L	352	8	2.27	NA	66	66	NA	NA	0.5	1.4	IR58MW35A (11-JUL-2002)	1	1	0	NA	0.00	0.00	NA	NA
VOC	1,2,3-Trichloropropane	µg/L	382	2	0.52	NA	0.3	0.51	NA	0.5	1.5	16	IR28MW934F2 (06-MAR-2001)	9	9	7	NA	1.00	1.00	NA	1.00
VOC	1,2,4-Trichlorobenzene	µg/L	1,051	56	5.33	NA	66	66	129	0.5	0.32	200	IR25MW19A (29-JAN-1998)	18	5	37	NA	0.07	0.07	0.04	0.89
VOC	1,2,4-Trimethylbenzene	µg/L	207	29	14.01	NA	25	25	NA	0.5	0.2	220	IR28MW909A (08-FEB-2001, 12-FEB-2001)	45	13	67	NA	0.38	0.38	NA	0.97
VOC	1,2-Dibromo-3-Chloropropane	µg/L	707	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	1,2-Dibromoethane	µg/L	545	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	1,2-Dichlorobenzene	µg/L	1,065	206	19.34	NA	2,600	2,600	129	0.5	0.09	62,000	IR25MW15A1 (14-JUN-1994)	3,577	37	10,039	NA	0.20	0.20	0.39	0.90
VOC	1,2-Dichloroethane	µg/L	1,083	125	11.54	NA	2.3	3.9	22,600	0.5	0.17	150,000	IR25MW15A1 (26-MAY-1995)	8,263	93	23,217	NA	0.79	0.74	0.10	0.94
VOC	1,2-Dichloroethene (Total)	µg/L	287	89	31.01	NA	210	210	44,800	0.5	0.3	57,000	IR25MW15A1 (11-AUG-1994)	2,304	14	9,200	NA	0.26	0.26	0.01	0.94
VOC	1,2-Dichloropropane	µg/L	1,067	38	3.56	NA	1.1	1.8	3,040	0.5	0.2	350	IR25MW19A (29-JAN-1998)	53	3	100	NA	0.63	0.58	0.00	0.79
VOC	1,3,5-Trimethylbenzene	µg/L	207	10	4.83	NA	19	19	NA	0.5	0.79	28	IR28MW909A (24-JAN-2001)	9	6	9	NA	0.20	0.20	NA	1.00
VOC	1,3-Dichlorobenzene	µg/L	1,064	87	8.18	NA	1,300	1,300	129	NA	0.1	630	IR25MW19A (22-JAN-2001)	45	10	97	NA	0.00	0.00	0.10	NA
VOC	1,3-Dichloropropane	µg/L	207	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	1,4-Dichlorobenzene	µg/L	1,064	175	16.45	NA	2.1	3.6	129	0.5	0.12	15,000	IR25MW19A (29-JAN-1998)	983	31	2,488	NA	0.73	0.68	0.39	0.89
VOC	2,2'-Oxybis(1-chloropropane)	µg/L	2	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	2,2-Dichloropropane	µg/L	207	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	2-Butanone	µg/L	785	3	0.38	NA	4,400,000	4,400,000	NA	NA	0.7	29	IR06MW22AD (15-JUL-1991)	12	7	12	NA	0.00	0.00	NA	NA
VOC	2-Chloroethyl Vinyl Ether	µg/L	60	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	2-Chlorotoluene	µg/L	207	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	2-Hexanone	µg/L	582	1	0.17	NA	NA	NA	NA	NA	0.4	0.4	IR28MW342F (18-MAR-2003)	0	0	NA	NA	NA	NA	NA	NA
VOC	4-Chlorotoluene	µg/L	207	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	4-Methyl-2-Pentanone	µg/L	758	5	0.66	NA	520,000	520,000	NA	NA	0.2	9	IR25MW15A1 (26-MAY-1995)	2	1	3	NA	0.00	0.00	NA	NA
VOC	Acetone	µg/L	708	26	3.67	NA	2,000,000	2,000,000	NA	NA	4.3	6,900	IR28MW936F (05-APR-2001)	428	22	1,359	NA	0.00	0.00	NA	NA
VOC	Benzene	µg/L	1,076	223	20.72	NA	0.37	0.63	700	0.5	0.1	400	IR25MW19A (22-JAN-2001)	18	2	52	NA	0.85	0.77	0.00	0.80
VOC	Bromobenzene	µg/L	382	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	Bromochloromethane	µg/L	504	0	0.00	NA	NA	NA	6,400	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	Bromodichloromethane	µg/L	1,067	11	1.03	NA	1	1.7	6,400	0.5	0.15	130	IR25MW19A (22-JAN-2001)	18	1	38	NA	0.45	0.45	0.00	0.64
VOC	Bromoform	µg/L	1,067	4	0.37	NA	NA	NA	6,400	NA	1	33	IR28MW930A (28-AUG-2001)	11	5	13	NA	NA	NA	0.00	NA
VOC	Bromomethane	µg/L	1,067	6	0.56	NA	19	19	6,400	NA	0.3	8.1	IR58MW34A (08-JUL-2002)	3	2	3	NA	0.00	0.00	0.00	NA
VOC	Carbon Disulfide	µg/L	832	59	7.09	NA	560	560	NA	NA	0.16	39	IR29MW56F (10-AUG-1994)	3	1	6	NA	0.00	0.00	NA	NA
VOC	Carbon Tetrachloride	µg/L	1,083	95	8.77	NA	0.046	0.077	6,400	0.5	0.15	520	IR28MW937F (02-APR-2001)	41	12	82	NA	1.00	1.00	0.00	0.89
VOC	Chlorobenzene	µg/L	1,067	118	11.06	NA	390	390	129	0.5	0.13	9,900	IR28MW909A (08-FEB-2001)	456	29	1,140	NA	0.21	0.21	0.32	0.86

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Parcel C Residential RBC Vapor Intrusion	Parcel C Industrial RBC Vapor Intrusion	Surface Water Criteria	Laboratory PQL	Minimum Detected Concentration	Maximum Detected Concentration	Location(s) for Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Parcel C Residential RBC Vapor Intrusion	Detects Greater than Parcel C Industrial RBC Vapor Intrusion	Detects Greater than Surface Water Criteria	Detects Greater than Laboratory PQL
VOC	Chloroethane	µg/L	1,066	44	4.13	NA	6.5	11	NA	0.5	0.52	81	IR06MW30A (23-AUG-1994)	13	5	18	NA	0.36	0.30	NA	1.00
VOC	Chloroform	µg/L	1,083	246	22.71	NA	0.7	1.2	6,400	0.5	0.09	1,000	IR28MW937F (02-APR-2001)	49	3	133	NA	0.80	0.68	0.00	0.88
VOC	Chloromethane	µg/L	1,067	15	1.41	NA	92	92	6,400	NA	0.2	3.8	IR58MW34A (08-JUL-2002)	1	0	1	NA	0.00	0.00	0.00	NA
VOC	cis-1,2-Dichloroethene	µg/L	796	443	55.65	NA	210	210	44,800	0.5	0.12	58,000	IR25MW15A1 (05-FEB-1998)	1,342	21	6,111	NA	0.26	0.26	0.00	0.87
VOC	cis-1,3-Dichloropropene	µg/L	1,067	2	0.19	NA	0.21	0.36	NA	0.5	0.54	4	IR58MW33B (23-MAY-1996)	2	2	2	NA	1.00	1.00	NA	1.00
VOC	Cyclohexane	µg/L	123	6	4.88	NA	730	730	NA	NA	0.26	1.6	IR28MW128A (09-AUG-2002)	1	1	0	NA	0.00	0.00	NA	NA
VOC	Dibromochloromethane	µg/L	1,067	5	0.47	NA	2.6	4.4	6,400	0.5	0.2	3	IR58MW33B (23-MAY-1996)	1	0	1	NA	0.20	0.00	0.00	0.40
VOC	Dibromomethane	µg/L	382	0	0.00	NA	950	950	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	Dichlorodifluoromethane	µg/L	628	11	1.75	NA	14	14	NA	NA	0.22	4.2	IR25MW52A (08-JUN-2004)	2	2	1	NA	0.00	0.00	NA	NA
VOC	Ethylbenzene	µg/L	1,076	67	6.23	NA	3,100	3,100	86	NA	0.1	79	IR28MW155A (31-MAY-1994)	6	3	10	NA	0.00	0.00	0.00	NA
VOC	Isopropylbenzene	µg/L	393	34	8.65	NA	7.8	7.8	NA	0.5	0.11	15	IR28MW909A (24-JAN-2001)	2	1	3	NA	0.09	0.09	NA	0.74
VOC	m,p-Xylenes	µg/L	125	13	10.40	NA	340	340	NA	NA	0.23	28	IR25MW15A1 (13-AUG-2002)	6	2	8	NA	0.00	0.00	NA	NA
VOC	Methyl Acetate	µg/L	121	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	Methylcyclohexane	µg/L	123	4	3.25	NA	170	170	NA	NA	0.22	0.73	IR28MW128A (09-AUG-2002)	0	1	0	NA	0.00	0.00	NA	NA
VOC	Methylene Chloride	µg/L	1,067	33	3.09	NA	27	46	6,400	0.5	0.3	270	IR28MW936F (05-APR-2001)	40	12	66	NA	0.33	0.18	0.00	0.82
VOC	n-Butylbenzene	µg/L	207	4	1.93	NA	260	260	NA	NA	1.1	6.5	IR58MW35A (11-JUL-2002)	4	5	2	NA	0.00	0.00	NA	NA
VOC	Naphthalene	µg/L	603	103	17.08	NA	3.6	6	470	0.05	0.06	1,800	IR06MW42A (10-JAN-1992)	110	25	242	NA	0.84	0.76	0.04	1.00
VOC	o-Xylene	µg/L	125	23	18.40	NA	340	340	NA	NA	0.08	16	IR25MW15A1 (13-AUG-2002)	2	0	4	NA	0.00	0.00	NA	NA
VOC	Para-Isopropyl Toluene	µg/L	207	12	5.80	NA	820	820	NA	NA	0.52	34	IR25MW19A (22-JAN-2001)	7	3	9	NA	0.00	0.00	NA	NA
VOC	Propylbenzene	µg/L	207	9	4.35	NA	260	260	NA	NA	0.46	27	IR28MW909A (12-FEB-2001)	7	3	9	NA	0.00	0.00	NA	NA
VOC	Sec-Butylbenzene	µg/L	207	13	6.28	NA	180	180	NA	NA	0.2	4.8	IR28MW913A (25-JAN-2001)	2	2	2	NA	0.00	0.00	NA	NA
VOC	Styrene	µg/L	832	3	0.36	NA	9,000	9,000	NA	NA	1	7.9	IR25MW15A1 (11-JAN-2001)	4	4	3	NA	0.00	0.00	NA	NA
VOC	Tert-Butyl Methyl Ether	µg/L	716	67	9.36	NA	390	650	8,000	NA	0.09	25	IR28MW155A (18-JUN-2002)	3	1	4	NA	0.00	0.00	0.00	NA
VOC	Tert-Butylbenzene	µg/L	207	1	0.48	NA	270	270	NA	NA	0.4	0.4	IR58MW34A (08-JUL-2002)	0	0	NA	NA	0.00	0.00	NA	NA
VOC	Tetrachloroethene	µg/L	1,083	334	30.84	NA	0.54	0.9	450	0.5	0.1	72,000	IR25MW19A (29-JAN-1998, 22-JAN-2001)	2,031	5	8,612	NA	0.78	0.70	0.15	0.79
VOC	Toluene	µg/L	1,076	105	9.76	NA	1,400	1,400	5,000	NA	0.1	66	IR25MW19A (29-JAN-1998)	7	1	13	NA	0.00	0.00	0.00	NA
VOC	trans-1,2-Dichloroethene	µg/L	796	215	27.01	NA	180	180	44,800	0.5	0.14	2,400	IR25MW19A (22-JAN-2001)	60	5	236	NA	0.07	0.07	0.00	0.88
VOC	trans-1,3-Dichloropropene	µg/L	1,067	1	0.09	NA	0.21	0.36	NA	0.5	3	3	IR58MW33B (23-MAY-1996)	3	3	NA	NA	1.00	1.00	NA	1.00
VOC	Trichloroethene	µg/L	1,082	578	53.42	NA	2.9	4.8	400	0.5	0.12	76,000	IR28MW211F (13-NOV-2002)	1,950	13	7,820	NA	0.76	0.66	0.19	0.89
VOC	Trichlorofluoromethane	µg/L	628	82	13.06	NA	180	180	NA	0.5	0.24	5,900	IR25MW52A (17-JUN-2002)	122	3	661	NA	0.10	0.10	NA	0.80
VOC	Vinyl Acetate	µg/L	98	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
VOC	Vinyl Chloride	µg/L	1,083	318	29.36	NA	0.028	0.048	NA	0.5	0.28	6,600	IR25MW15A1 (05-OCT-1995)	286	62	669	NA	1.00	1.00	NA	0.94
VOC	Xylene (Total)	µg/L	951	77	8.10	NA	340	340	NA	NA	0.2	150	IR25MW19A (22-JAN-2001)	14	3	29	NA	0.00	0.00	NA	NA
SVOC	1,4-Dioxane	µg/L	13	2	15.38	NA	NA	NA	NA	NA	0.66	1.4	IR28MW151A (06-DEC-2004)	1	1	0	NA	NA	NA	NA	NA
SVOC	1-Methylnaphthalene	µg/L	4	2	50.00	NA	710	710	NA	NA	0.02	4	IR06MW22A (18-AUG-2000)	2	2	2	NA	0.00	0.00	NA	NA
SVOC	2,2'-Oxybis(1-chloropropane)	µg/L	400	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	2,4,5-Trichlorophenol	µg/L	375	1	0.27	NA	NA	NA	NA	NA	0.57	0.57	IR25MW15A1 (13-AUG-2002)	1	1	NA	NA	NA	NA	NA	NA
SVOC	2,4,6-Trichlorophenol	µg/L	393	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	2,4-Dichlorophenol	µg/L	393	4	1.02	NA	NA	NA	NA	NA	1.7	37	IR25MW15A1 (13-AUG-2002)	11	3	15	NA	NA	NA	NA	NA
SVOC	2,4-Dimethylphenol	µg/L	393	25	6.36	NA	NA	NA	NA	10	0.6	16,000	IR25MW15A1 (11-AUG-1994)	1,225	32	3,345	NA	NA	NA	NA	0.68
SVOC	2,4-Dinitrophenol	µg/L	388	0	0.00	NA	NA	NA	46	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	2,4-Dinitrotoluene	µg/L	403	1	0.25	NA	NA	NA	118	10	4900	4,900	IR25MW11A (07-JUN-1995)	4,900	4,900	NA	NA	NA	NA	1.00	1.00
SVOC	2,6-Dinitrotoluene	µg/L	402	0	0.00	NA	NA	NA	118	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	2-Chloronaphthalene	µg/L	402	2	0.50	NA	14,000	14,000	1.5	NA	1	1	IR25MW15A2 (26-MAY-1995), IR28MW129A (27-JUN-1995)	1	1	0	NA	0.00	0.00	0.00	NA
SVOC	2-Chlorophenol	µg/L	398	2	0.50	NA	1,100	1,100	NA	NA	1	24	IR25MW15A1 (13-AUG-2002)	13	13	12	NA	0.00	0.00	NA	NA
SVOC	2-Methylnaphthalene	µg/L	413	55	13.32	NA	710	710	NA	NA	0.5	920	IR25MW11A (18-AUG-1994)	49	10	137	NA	0.02	0.02	NA	NA
SVOC	2-Methylphenol	µg/L	392	11	2.81	NA	NA	NA	NA	NA	0.2	3,800	IR25MW15A1 (11-AUG-1994)	774	63	1,235	NA	NA	NA	NA	NA
SVOC	2-Nitroaniline	µg/L	379	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	2-Nitrophenol	µg/L	398	0	0.00	NA	NA	NA	970	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	3,3'-Dichlorobenzidine	µg/L	402	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	3,4-Methylphenol	µg/L	13	2	15.38	NA	NA	NA	NA	10	380	3,200	IR25MW19A (24-JAN-2001)	1,790	1,790	1,410	NA	NA	NA	NA	1.00
SVOC	3-Nitroaniline	µg/L	377	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	4,6-Dinitro-2-Methylphenol	µg/L	391	0	0.00	NA	NA	NA	970	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	4-Bromophenyl-Phenylether	µg/L	402	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	4-Chloro-3-Methylphenol	µg/L	393	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	4-Chloroaniline	µg/L	384	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	4-Chlorophenyl-Phenylether	µg/L	402	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	4-Methylphenol	µg/L	380	15	3.95	NA	NA	NA	NA	10	0.7	9,100	IR25MW15A1 (11-AUG-1994)	703	10	2,251	NA	NA	NA	NA	0.47
SVOC	4-Nitroaniline	µg/L	384	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	4-Nitrophenol	µg/L	399	0	0.00	NA	NA	NA	970	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Acenaphthene	µg/L	417	85	20.38	NA	33,000	33,000	710	NA	0.1	230	IR06MW42A (10-JAN-1992)	42	17	49	NA	0.00	0.00	0.00	NA
SVOC	Acenaphthylene	µg/L	417	14	3.36	NA	33,000	33,000	60	NA	0.07	10	IR06MW42A (16-JAN-2001, 01-MAY-2001)	2	1	3	NA	0.00	0.00	0.00	NA
SVOC	Acetophenone	µg/L	13	3	23.08	NA	750,000	750,000	NA	NA	2	24	IR06MW42A (28-AUG-2002)	11	6	10	NA	0.00	0.00	NA	NA
SVOC	Aniline	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

TABLE 2-14: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, A-AQUIFER (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Parcel C Residential RBC Vapor Intrusion	Parcel C Industrial RBC Vapor Intrusion	Surface Water Criteria	Laboratory PQL	Minimum Detected Concentration	Maximum Detected Concentration	Location(s) for Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Parcel C Residential RBC Vapor Intrusion	Detects Greater than Parcel C Industrial RBC Vapor Intrusion	Detects Greater than Surface Water Criteria	Detects Greater than Laboratory PQL
SVOC	Anthracene	µg/L	417	45	10.79	NA	390,000	390,000	60	NA	0.074	21	IR06MW42A (08-JAN-1991)	4	3	4	NA	0.00	0.00	0.00	NA
SVOC	Atrazine	µg/L	13	0	0.00	NA	NA	NA	11	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Azobenzene	µg/L	12	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Benzaldehyde	µg/L	14	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Benzo(a)anthracene	µg/L	417	10	2.40	NA	NA	NA	60	0.05	0.01	10	IR06MW42A (16-JAN-2001)	2	1	3	NA	NA	NA	0.00	0.80
SVOC	Benzo(a)pyrene	µg/L	415	3	0.72	NA	NA	NA	60	0.05	0.21	3	IR28MW311A (19-APR-1996)	2	2	1	NA	NA	NA	0.00	1.00
SVOC	Benzo(b)fluoranthene	µg/L	415	3	0.72	NA	NA	NA	60	0.05	0.055	4	IR28MW311A (19-APR-1996)	2	2	2	NA	NA	NA	0.00	1.00
SVOC	Benzo(e)pyrene	µg/L	4	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Benzo(g,h,i)perylene	µg/L	415	0	0.00	NA	NA	NA	60	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Benzo(k)fluoranthene	µg/L	415	2	0.48	NA	NA	NA	60	0.05	1	1	IR28MW311A (19-APR-1996), PA28MW52A (23-FEB-1993)	1	1	0	NA	NA	NA	0.00	1.00
SVOC	Benzoic Acid	µg/L	92	2	2.17	NA	NA	NA	NA	NA	5	10	IR25MW15A1 (13-AUG-2002)	8	8	3	NA	NA	NA	NA	NA
SVOC	Benzyl Alcohol	µg/L	75	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Biphenyl	µg/L	17	4	23.53	NA	14,000	14,000	NA	NA	0.1	10	IR06MW42A (16-JAN-2001, 01-MAY-2001)	5	6	5	NA	0.00	0.00	NA	NA
SVOC	Bis(2-chloroethoxy)methane	µg/L	402	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Bis(2-chloroethyl)ether	µg/L	402	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Bis(2-ethylhexyl)phthalate	µg/L	402	6	1.49	NA	NA	NA	NA	NA	1	99	PA50MW03A (11-JUL-1994)	54	57	32	NA	NA	NA	NA	NA
SVOC	Butylbenzylphthalate	µg/L	402	1	0.25	NA	NA	NA	588.8	NA	7	7	IR06MW30A (12-JUN-1990)	7	7	NA	NA	NA	NA	0.00	NA
SVOC	Caprolactam	µg/L	15	2	13.33	NA	NA	NA	NA	NA	10	25	IR06MW42A (12-OCT-2000)	18	18	8	NA	NA	NA	NA	NA
SVOC	Carbazole	µg/L	308	30	9.74	NA	NA	NA	NA	NA	0.1	53	IR06MW42A (16-MAY-1994)	8	4	13	NA	NA	NA	NA	NA
SVOC	Chrysene	µg/L	418	7	1.67	NA	NA	NA	60	0.05	0.02	200	IR25MW11A (07-JUN-1995)	31	3	69	NA	NA	NA	0.14	0.71
SVOC	Di-N-Butylphthalate	µg/L	402	2	0.50	NA	NA	NA	588.8	NA	0.9	1	IR28MW128A (25-MAY-1994)	1	1	0	NA	NA	NA	0.00	NA
SVOC	Di-N-Octylphthalate	µg/L	400	0	0.00	NA	NA	NA	588.8	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Dibenz(a,h)anthracene	µg/L	415	0	0.00	NA	NA	NA	60	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Dibenzofuran	µg/L	403	56	13.90	NA	13,000	13,000	NA	NA	0.42	140	IR06MW42A (08-JAN-1991, 16-JUL-1991, 10-JAN-1992)	24	7	36	NA	0.00	0.00	NA	NA
SVOC	Dibenzothiophene	µg/L	4	2	50.00	NA	44,000	44,000	NA	NA	0.09	0.1	IR06MW22A (18-AUG-2000)	0	0	0	NA	0.00	0.00	NA	NA
SVOC	Diethylphthalate	µg/L	402	2	0.50	NA	NA	NA	588.8	NA	6	10	IR06MW42A (03-JUN-2004)	8	8	2	NA	NA	NA	0.00	NA
SVOC	Dimethylphthalate	µg/L	402	0	0.00	NA	NA	NA	3.4	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Fluoranthene	µg/L	417	55	13.19	NA	NA	NA	16	NA	0.06	36	IR06MW42A (08-JAN-1991)	8	8	7	NA	NA	NA	0.16	NA
SVOC	Fluorene	µg/L	418	65	15.55	NA	44,000	44,000	60	NA	0.2	180	IR25MW11A (28-DEC-1993)	26	7	41	NA	0.00	0.00	0.14	NA
SVOC	Hexachlorobenzene	µg/L	402	0	0.00	NA	NA	NA	129	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Hexachlorobutadiene	µg/L	587	0	0.00	NA	NA	NA	6.4	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Hexachlorocyclopentadiene	µg/L	402	0	0.00	NA	NA	NA	1.4	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Hexachloroethane	µg/L	402	1	0.25	NA	NA	NA	188	NA	8	8	IR25MW16A (01-JUN-1995)	8	8	NA	NA	NA	NA	0.00	NA
SVOC	Indeno(1,2,3-cd)pyrene	µg/L	415	0	0.00	NA	NA	NA	60	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Isophorone	µg/L	402	0	0.00	NA	NA	NA	2,580	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	n-Nitroso-Di-N-Propylamine	µg/L	402	0	0.00	NA	NA	NA	660,000	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	n-Nitrosodimethylamine	µg/L	31	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	n-Nitrosodiphenylamine	µg/L	402	1	0.25	NA	NA	NA	660,000	NA	6.4	6.4	IR29MW56F (13-SEP-2004)	6	6	NA	NA	NA	NA	0.00	NA
SVOC	Naphthalene, 1,6,7-Trimethyl-	µg/L	4	2	50.00	NA	710	710	NA	NA	0.4	0.4	IR06MW22A (18-AUG-2000), IR25MW16A (17-AUG-2000)	0	0	0	NA	0.00	0.00	NA	NA
SVOC	Naphthalene, 2,6-Dimethyl-	µg/L	4	2	50.00	NA	710	710	NA	NA	0.2	2	IR06MW22A (18-AUG-2000)	1	1	1	NA	0.00	0.00	NA	NA
SVOC	Nitrobenzene	µg/L	402	0	0.00	NA	NA	NA	1,336	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Pentachlorophenol	µg/L	393	4	1.02	NA	NA	NA	7.9	50	0.3	6,100	IR25MW11A (07-JUN-1995)	1,526	2	2,641	NA	NA	NA	0.25	0.25
SVOC	Perylene	µg/L	4	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Phenacetin	µg/L	7	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SVOC	Phenanthrene	µg/L	418	78	18.66	NA	190,000	190,000	60	NA	0.08	590	IR25MW11A (18-AUG-1994)	27	6	79	NA	0.00	0.00	0.13	NA
SVOC	Phenanthrene, 1-Methyl-	µg/L	4	2	50.00	NA	190,000	190,000	NA	NA	0.01	0.05	IR06MW22A (18-AUG-2000)	0	0	0	NA	0.00	0.00	NA	NA
SVOC	Phenol	µg/L	393	10	2.54	NA	NA	NA	1,160	NA	1.5	2,300	IR25MW15A1 (11-AUG-1994)	414	81	671	NA	NA	NA	0.10	NA
SVOC	Pyrene	µg/L	417	55	13.19	NA	230,000	230,000	60	NA	0.1	16	IR06MW42A (08-JAN-1991)	5	5	4	NA	0.00	0.00	0.00	NA
PEST	4,4'-DDD	µg/L	247	3	1.21	NA	NA	NA	0.72	NA	0.01	0.06	IR58MW33B (23-MAY-1996)	0	0	0	NA	NA	NA	0.00	NA
PEST	4,4'-DDE	µg/L	247	5	2.02	NA	NA	NA	2.8	NA	0.006	0.2	IR29MW48A (06-JUN-1994)	0	0	0	NA	NA	NA	0.00	NA
PEST	4,4'-DDT	µg/L	247	7	2.83	NA	NA	NA	0.001	NA	0.0094	0.5	IR58MW31A (22-FEB-2001)	0	0	0	NA	NA	NA	1.00	NA
PEST	Aldrin	µg/L	247	4	1.62	NA	NA	NA	0.26	NA	0.01	0.08	IR28MW124A (02-AUG-1995), IR29MW48A (06-JUN-1994)	0	0	0	NA	NA	NA	0.00	NA
PEST	alpha-BHC	µg/L	247	2	0.81	NA	NA	NA	NA	NA	0.02	0.02	IR25MW15A1 (17-AUG-2000, 01-FEB-2001)	0	0	0	NA	NA	NA	NA	NA
PEST	alpha-Chlordane	µg/L	247	7	2.83	NA	NA	NA	0.004	NA	0.0079	1	IR29MW48A (06-JUN-1994)	0	0	0	NA	NA	NA	1.00	NA
PEST	Azinphos Methyl	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	beta-BHC	µg/L	247	6	2.43	NA	NA	NA	NA	NA	0.005	0.04	IR58MW32B (17-APR-1996)	0	0	0	NA	NA	NA	NA	NA
PEST	Bolstar	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Chlorpyrifos	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Coumaphos	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	delta-BHC	µg/L	247	8	3.24	NA	NA	NA	NA	NA	0.0018	0.03	IR06MW42A (16-JAN-2001), IR25MW15A1 (17-AUG-2000)	0	0	0	NA	NA	NA	NA	NA

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Parcel C Residential RBC Vapor Intrusion	Parcel C Industrial RBC Vapor Intrusion	Surface Water Criteria	Laboratory PQL	Minimum Detected Concentration	Maximum Detected Concentration	Location(s) for Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Parcel C Residential RBC Vapor Intrusion	Detects Greater than Parcel C Industrial RBC Vapor Intrusion	Detects Greater than Surface Water Criteria	Detects Greater than Laboratory PQL
PEST	Demeton	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Diazinon	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Dichlorvos	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Dieldrin	µg/L	247	7	2.83	NA	NA	NA	0.142	NA	0.006	0.09	IR58MW31A (22-FEB-2001)	0	0	0	NA	NA	NA	0.00	NA
PEST	Dimethoate	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Disulfoton	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Endosulfan I	µg/L	247	0	0.00	NA	NA	NA	0.0087	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Endosulfan II	µg/L	247	2	0.81	NA	NA	NA	0.0087	NA	0.02	0.07	IR29MW48A (06-JUN-1994)	0	0	0	NA	NA	NA	1.00	NA
PEST	Endosulfan Sulfate	µg/L	247	3	1.21	NA	NA	NA	NA	NA	0.01	0.1	IR25MW16A (02-JUN-1994)	0	0	0	NA	NA	NA	NA	NA
PEST	Endrin	µg/L	247	5	2.02	NA	NA	NA	0.0023	NA	0.0041	0.02	IR58MW31A (11-AUG-2000)	0	0	0	NA	NA	NA	1.00	NA
PEST	Endrin Aldehyde	µg/L	247	6	2.43	NA	NA	NA	NA	NA	0.007	0.1	IR58MW31A (01-JUL-1994)	0	0	0	NA	NA	NA	NA	NA
PEST	Endrin Ketone	µg/L	243	2	0.82	NA	NA	NA	NA	NA	0.01	0.1	IR25MW15A1 (26-MAY-1995)	0	0	0	NA	NA	NA	NA	NA
PEST	EPN	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Ethion	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Ethoprop	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Famphur	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Fensulfothion	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Fenthion	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	gamma-BHC (Lindane)	µg/L	247	2	0.81	NA	NA	NA	0.032	NA	0.01	0.01	IR25MW15A1 (17-AUG-2000, 01-FEB-2001)	0	0	0	NA	NA	NA	0.00	NA
PEST	gamma-Chlordane	µg/L	247	5	2.02	NA	NA	NA	0.004	NA	0.006	1	IR29MW48A (06-JUN-1994)	0	0	0	NA	NA	NA	1.00	NA
PEST	Heptachlor	µg/L	247	4	1.62	NA	NA	NA	0.0036	NA	0.002	0.013	IR06MW42A (05-MAR-2003)	0	0	0	NA	NA	NA	0.50	NA
PEST	Heptachlor Epoxide	µg/L	243	6	2.47	NA	NA	NA	0.0036	NA	0.002	0.03	IR25MW15A1 (14-JUN-1994), IR28MW311A (27-JUN-1996)	0	0	0	NA	NA	NA	0.83	NA
PEST	Heptachlor Epoxide A	µg/L	4	1	25.00	NA	NA	NA	NA	NA	0.055	0.055	IR25MW15A1 (13-AUG-2002)	0	0	NA	NA	NA	NA	NA	NA
PEST	Heptachlor Epoxide B	µg/L	4	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Malathion	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Merphos	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Methoxychlor	µg/L	247	1	0.40	NA	NA	NA	0.003	NA	0.0084	0.0084	IR06MW42A (20-MAY-2003)	0	0	NA	NA	NA	NA	1.00	NA
PEST	Methyl Parathion	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Mevinphos	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Naled	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Parathion	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Phorate	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Ronnel	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Sulfotep	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Tetrachlorvinphos	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Tokuthion	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Toxaphene	µg/L	247	0	0.00	NA	NA	NA	0.0002	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PEST	Trichloronate	µg/L	1	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB	Aroclor-1016	µg/L	291	0	0.00	NA	NA	NA	0.03	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB	Aroclor-1221	µg/L	291	0	0.00	NA	NA	NA	0.03	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB	Aroclor-1232	µg/L	291	0	0.00	NA	NA	NA	0.03	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB	Aroclor-1242	µg/L	291	0	0.00	NA	NA	NA	0.03	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB	Aroclor-1248	µg/L	291	1	0.34	NA	NA	NA	0.03	NA	2	2	IR29MW48A (06-JUN-1994)	2	2	NA	NA	NA	NA	1.00	NA
PCB	Aroclor-1254	µg/L	291	0	0.00	NA	NA	NA	0.03	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PCB	Aroclor-1260	µg/L	291	31	10.65	NA	NA	NA	0.03	NA	0.06	23	IR28MW129A (27-JUN-1995)	3	1	4	NA	NA	NA	1.00	NA
TPHEXT	Diesel-Range Organics	µg/L	643	295	45.88	NA	NA	NA	1,400	NA	39	3,400,000	IR25MW11A (18-AUG-1994)	20,299	500	205,051	NA	NA	NA	0.24	NA
TPHEXT	Motor Oil-Range Organics	µg/L	571	265	46.41	NA	NA	NA	1,400	NA	20	200,000	IR25MW19A (15-MAR-2001)	1,383	240	12,321	NA	NA	NA	0.08	NA
TPHEXT	TPH-Extractable Unknown Hydrocarbon	µg/L	17	5	29.41	NA	NA	NA	NA	NA	310	7,000	IR06MW22AD (06-JAN-1992)	2,544	2,000	2,446	NA	NA	NA	NA	NA
TPHEXT	TPH-Kerosene	µg/L	4	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TPHPRG	Diesel-Range Organics	µg/L	3	1	33.33	NA	NA	NA	1,400	NA	920	920	IR06MW42A (23-MAR-2004)	920	920	NA	NA	NA	NA	0.00	NA
TPHPRG	Gasoline-Range Organics	µg/L	553	220	39.78	NA	NA	NA	1,400	NA	8.5	1,300,000	IR25MW11A (28-DEC-1993)	10,759	170	89,358	NA	NA	NA	0.20	NA
TPHPRG	Motor Oil-Range Organics	µg/L	3	0	0.00	NA	NA	NA	1,400	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TPHPRG	TPH-Purgeable Unknown Hydrocarbon	µg/L	9	2	22.22	NA	NA	NA	NA	NA	17	68	IR28MW124A (20-MAY-1994)	43	43	26	NA	NA	NA	NA	NA
TRPH	TRPH	µg/L	195	36	18.46	NA	NA	NA	NA	NA	400	63,000,000	IR25MW11A (07-JUN-1995)	2,313,742	850	10,606,495	NA	NA	NA	NA	NA
SOLIDS	Total Dissolved Solids	µg/L	555	555	100.00	NA	NA	NA	NA	NA	61,000	34,000,000	IR28MW269A (22-AUG-2000)	6,225,497	3,410,000	7,433,192	NA	NA	NA	NA	NA
SOLIDS	Total Suspended Solids	µg/L	50	18	36.00	NA	NA	NA	NA	NA	3,000	410,000	IR06MW45A (31-AUG-2004)	50,778	19,500	93,628	NA	NA	NA	NA	NA
O&G	Total Oil & Grease	µg/L	53	8	15.09	NA	NA	NA	NA	NA	300	7,000	IR06MW41A (08-JAN-1992)	2,350	800	2,540	NA	NA	NA	NA	NA
ORGAN	Tributyltin	µg/L	11	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOC	Total Organic Carbon	µg/L	50	40	80.00	NA	NA	NA	NA	NA	720	50,000	IR25MW15A1 (06-MAY-1999)	5,508	2,650	8,044	NA	NA	NA	NA	NA
ALKALN	Bicarbonate Alkalinity	µg/L	126	126	100.00	NA	NA	NA	NA	NA	44,000	1,430,000	IR28MW170A (22-FEB-2001)	403,751	353,500	250,490	NA	NA	NA	NA	NA
ALKALN	Carbonate Alkalinity	µg/L	126	24	19.05	NA	NA	NA	NA	NA	40,000	229,000	IR28MW330A (28-JAN-1998)	131,900	139,500	52,212	NA	NA	NA	NA	NA
ALKALN	Hydroxide Alkalinity	µg/L	101	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ALKALN	Total Alkalinity	µg/L	219	219	100.00	NA	NA	NA	NA	NA	14,000	1,430,000	IR28MW170A (22-FEB-2001)	346,329	287,000	253,020	NA	NA	NA	NA	NA
AMMON	Ammonia	µg/L	28	27	96.43	NA	NA	NA	NA	NA	120	2,500	IR06MW40A (17-JUL-1991)	986	890	722	NA	NA	NA	NA	NA

TABLE 2-14: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, A-AQUIFER (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Parcel C Residential RBC Vapor Intrusion	Parcel C Industrial RBC Vapor Intrusion	Surface Water Criteria	Laboratory PQL	Minimum Detected Concentration	Maximum Detected Concentration	Location(s) for Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Parcel C Residential RBC Vapor Intrusion	Detects Greater than Parcel C Industrial RBC Vapor Intrusion	Detects Greater than Surface Water Criteria	Detects Greater than Laboratory PQL
ANION	Chloride	µg/L	386	385	99.74	NA	NA	NA	NA	NA	7,700	17,400,000	IR28MW270A (06-MAY-1996)	2,810,272	1,290,000	4,035,306	NA	NA	NA	NA	NA
ANION	Fluoride	µg/L	79	46	58.23	NA	NA	NA	NA	NA	110	3,700	IR25MW20A (29-JAN-1998)	569	405	624	NA	NA	NA	NA	NA
ANION	Nitrate As Nitrogen	µg/L	322	197	61.18	NA	NA	NA	NA	NA	10	104,000	IR29MW56F (22-JUN-1995)	3,139	710	9,409	NA	NA	NA	NA	NA
ANION	Nitrate/Nitrite As Nitrogen	µg/L	161	110	68.32	NA	NA	NA	NA	NA	10	30,900	IR28MW217A (28-APR-1999)	1,646	425	4,003	NA	NA	NA	NA	NA
ANION	Nitrite As Nitrogen	µg/L	229	27	11.79	NA	NA	NA	NA	NA	6	870	IR06MW44A (28-JAN-1998)	85	15	196	NA	NA	NA	NA	NA
ANION	Orthophosphate	µg/L	142	24	16.90	NA	NA	NA	NA	NA	64	29,000	IR29MW85F (24-MAY-1996)	2,222	530	5,766	NA	NA	NA	NA	NA
ANION	Sulfate	µg/L	335	320	95.52	NA	NA	NA	NA	NA	1,300	6,580,000	IR28MW297A (07-MAY-1996)	452,637	172,000	679,947	NA	NA	NA	NA	NA
CEC	Calcium	µg/L	32	32	100.00	NA	NA	NA	NA	NA	2,300	330,000	IR28MW150A (03-AUG-2000), IR28MW270A (04-AUG-2000), IR29MW57A (23-JUN-1995)	79,150	35,500	88,793	NA	NA	NA	NA	NA
CEC	Iron	µg/L	32	7	21.88	2,380	NA	NA	NA	NA	590	16,000	IR25MW15A2 (16-AUG-2000)	5,459	5,600	5,046	0.57	NA	NA	NA	NA
CEC	Magnesium	µg/L	32	32	100.00	1,440,000	NA	NA	NA	NA	2,800	1,100,000	IR25MW17A (29-MAR-2004), IR28MW270A (04-AUG-2000), IR28MW297A (20-NOV-1995)	335,784	255,000	307,068	0.00	NA	NA	NA	NA
CEC	Potassium	µg/L	32	31	96.88	448,000	NA	NA	NA	NA	370	360,000	IR28MW270A (04-AUG-2000)	68,117	41,000	85,398	0.00	NA	NA	NA	NA
CEC	Sodium	µg/L	32	31	96.88	9,242,000	NA	NA	NA	NA	12,000	11,000,000	IR28MW270A (04-AUG-2000)	1,812,710	860,000	2,555,009	0.03	NA	NA	NA	NA
CYAN	Cyanide	µg/L	9	2	22.22	NA	NA	NA	1	NA	0.76	1.2	PA50MW03A (25-MAR-1996)	1	1	0	NA	NA	NA	0.50	NA
DGASES	Carbon Dioxide In Water	µg/L	33	14	42.42	NA	NA	NA	NA	NA	16,000	406,000	IR28MW217A (28-APR-1999)	146,000	146,500	107,038	NA	NA	NA	NA	NA
DGASES	Ethane	µg/L	118	31	26.27	NA	NA	NA	NA	NA	0.3	77	IR28MW211F (21-MAR-2003)	21	7	24	NA	NA	NA	NA	NA
DGASES	Ethene	µg/L	118	28	23.73	NA	NA	NA	NA	NA	0.4	620	IR25MW15A1 (06-MAY-1999)	55	11	123	NA	NA	NA	NA	NA
DGASES	Hydrogen In Water	µg/L	84	4	4.76	NA	NA	NA	NA	NA	35.9	226	IR28MW362F (06-FEB-2003)	117	102	81	NA	NA	NA	NA	NA
DGASES	Methane	µg/L	67	45	67.16	NA	NA	NA	NA	NA	2	8,500	IR06MW34A (27-APR-1999)	625	160	1,475	NA	NA	NA	NA	NA
DO	Dissolved Oxygen	µg/L	227	227	100.00	NA	NA	NA	NA	NA	50	8,660	IR29MW56F (22-AUG-2000)	3,101	2,860	2,488	NA	NA	NA	NA	NA
DO	Downhole Dissolved Oxygen Bottom	µg/L	157	157	100.00	NA	NA	NA	NA	NA	50	6,300	IR28MW275F (17-AUG-2000)	1,117	510	1,282	NA	NA	NA	NA	NA
DO	Downhole Dissolved Oxygen Middle	µg/L	160	160	100.00	NA	NA	NA	NA	NA	80	8,400	IR28MW169A (23-FEB-2001)	1,683	965	1,608	NA	NA	NA	NA	NA
DO	Downhole Dissolved Oxygen Top	µg/L	164	164	100.00	NA	NA	NA	NA	NA	250	9,000	IR28MW298A (14-AUG-2000)	2,503	1,905	1,907	NA	NA	NA	NA	NA
FTK-METAL	Dissolved Iron (II)	µg/L	1	1	100.00	NA	NA	NA	NA	NA	0	0	IR29MW56F (02-MAR-2001)	0	0	NA	NA	NA	NA	NA	NA
FTK-METAL	Dissolved Manganese (II)	µg/L	3	3	100.00	NA	NA	NA	NA	NA	100	800	IR28MW398A (01-MAR-2001)	500	600	294	NA	NA	NA	NA	NA
FTK-METAL	Total Iron (II)	µg/L	117	117	100.00	NA	NA	NA	NA	NA	0	7,200	IR25MW15A2 (16-AUG-2000)	503	0	1,227	NA	NA	NA	NA	NA
FTK-METAL	Total Manganese (II)	µg/L	92	92	100.00	NA	NA	NA	NA	NA	0	14,000	IR06MW41A (14-AUG-2002)	1,440	300	2,637	NA	NA	NA	NA	NA
H2S	Hydrogen Sulfide	µg/L	30	0	0.00	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HARD	Hardness	µg/L	25	25	100.00	NA	NA	NA	NA	NA	140	4,500,000	IR25MW18A (29-JAN-1998)	1,099,109	970,000	927,443	NA	NA	NA	NA	NA
IRON_ION	Iron (II)	µg/L	34	2	5.88	NA	NA	NA	NA	NA	180	510	IR25MW15A2 (27-APR-1999)	345	345	165	NA	NA	NA	NA	NA
IRON_ION	Iron (III)	µg/L	1	1	100.00	NA	NA	NA	NA	NA	110	110	IR25MW37A (11-JUN-2002)	110	110	NA	NA	NA	NA	NA	NA
MEE	Ethane	µg/L	183	5	2.73	NA	NA	NA	NA	NA	3.4	13	IR28MW916A (08-FEB-2001)	7	6	3	NA	NA	NA	NA	NA
MEE	Ethene	µg/L	183	46	25.14	NA	NA	NA	NA	NA	3.9	570	IR25MW15A1 (01-FEB-2001)	144	33	175	NA	NA	NA	NA	NA
MEE	Methane	µg/L	183	124	67.76	NA	NA	NA	NA	NA	2	16,000	IR28MW918A (08-FEB-2001)	762	165	2,239	NA	NA	NA	NA	NA

Notes:

µg/L	Microgram per liter
ALKALIN	Alkalinity
BHC	Benzene hexachloride
CEC	Cation exchange capacity
CHROM	Chromium
CYAN	Cyanide
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
DGASES	Dissolved gases
DO	Dissolved oxygen
EPN	Ethoxy-(((4-nitrophenoxy)phenyl)phosphine) sulfide
FTK-METAL	Field test kit- metal
H2S	Hydrogen sulfide
HARD	Hardness
HGAL	Hunters Point groundwater ambient level
NA	Not applicable or not available
ND	Not detected
ORGAN	Organotins
O&G	Oil and grease
PCB	Polychlorinated biphenyl
PEST	Pesticides
PQL	Practical quantitation limit
RBC	Risk-based concentration
SVOC	Semivolatile organic compound
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
TPHEXT	Total petroleum hydrocarbons-extractables
TPHPRG	Total petroleum hydrocarbons-purgeables
TRPH	Total recoverable petroleum hydrocarbons
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compound

TABLE 2-15: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, B-AQUIFER

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Detections/ Analyses	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Greater of Surface Water Criteria and HGAL	Frequency of Samples Above Criteria[1]	COPEC/ COEC
CHROM	Chromium VI	µg/L	10	0	0.00	0.00	NA	50	ND	ND	ND	ND	ND	ND	ND	50	0 / 10	–
METAL	Aluminum	µg/L	12	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
METAL	Antimony	µg/L	12	2	0.17	16.67	43.26	NA	3.4	5.3	4.4	4.4	1.0	0.00	NA	43.26	0 / 12	–
METAL	Arsenic	µg/L	12	2	0.17	16.67	27.34	36	1.9	2.8	2.4	2.4	0.5	0.00	0.00	36	0 / 12	–
METAL	Barium	µg/L	12	12	1.00	100.00	504.20	NA	65.8	730	435.1	467.0	242.9	0.50	NA	504.2	6 / 12	–
METAL	Beryllium	µg/L	12	0	0.00	0.00	1.40	NA	ND	ND	ND	ND	ND	ND	ND	1.4	0 / 12	–
METAL	Cadmium	µg/L	12	2	0.17	16.67	5.08	8.8	0.37	0.63	0.5	0.5	0.1	0.00	0.00	8.8	0 / 12	–
METAL	Calcium	µg/L	21	21	1.00	100.00	NA	NA	7,700	1,070,000	270,147.6	123,000	279,349.3	NA	NA	NA	NA	–
METAL	Chromium	µg/L	12	1	0.08	8.33	15.66	50	5.9	5.9	5.9	5.9	NA	0.00	0.00	50	0 / 12	–
METAL	Cobalt	µg/L	12	9	0.75	75.00	20.80	NA	0.82	6.3	2.7	2.1	1.8	0.00	NA	20.8	0 / 12	–
METAL	Copper	µg/L	12	2	0.17	16.67	28.04	3.1	3.6	4	3.8	3.8	0.2	0.00	1.00	28.04	0 / 12	–
METAL	Iron	µg/L	21	5	0.24	23.81	2,380	NA	10.1	429	130.6	70.1	152.2	0.00	NA	2,380	0 / 21	–
METAL	Lead	µg/L	12	1	0.08	8.33	14.44	5.6	2	2	2.0	2.0	NA	0.00	0.00	14.44	0 / 12	–
METAL	Magnesium	µg/L	21	21	1.00	100.00	1,440,000	NA	14,700	3,640,000	884,223.8	657,000	804,046.5	0.24	NA	1,440,000	5 / 21	–
METAL	Manganese	µg/L	12	12	1.00	100.00	8,140	NA	30	1,480	823.2	767.0	460.5	0.00	NA	8,140	0 / 12	–
METAL	Mercury	µg/L	19	1	0.05	5.26	0.60	0.025	0.18	0.18	0.2	0.2	NA	0.00	1.00	0.6	0 / 19	–
METAL	Molybdenum	µg/L	12	1	0.08	8.33	61.90	NA	1.7	1.7	1.7	1.7	NA	0.00	NA	61.9	0 / 12	–
METAL	Nickel	µg/L	12	11	0.92	91.67	96.48	8.2	15.9	49.6	27.1	24.5	9.4	0.00	1.00	96.48	0 / 12	–
METAL	Potassium	µg/L	21	21	1.00	100.00	448,000	NA	765	295,000	56,075.5	27,000	78,460.5	0.00	NA	448,000	0 / 21	–
METAL	Selenium	µg/L	12	4	0.33	33.33	14.50	71	2.8	4.6	3.9	4.2	0.7	0.00	0.00	71	0 / 12	–
METAL	Silver	µg/L	12	0	0.00	0.00	7.43	0.38	ND	ND	ND	ND	ND	ND	ND	7.43	0 / 12	–
METAL	Sodium	µg/L	21	21	1.00	100.00	9,242,000	NA	193,000	8,000,000	3,027,666.7	2,400,000	1,989,382.8	0.00	NA	9,242,000	0 / 21	–
METAL	Thallium	µg/L	12	1	0.08	8.33	12.97	426	3	3	3.0	3.0	NA	0.00	0.00	426	0 / 12	–
METAL	Vanadium	µg/L	12	9	0.75	75.00	26.62	NA	0.72	11	5.4	5.9	3.4	0.00	NA	26.62	0 / 12	–
METAL	Zinc	µg/L	13	5	0.38	38.46	75.68	81	11.3	143	50.6	28.0	49.1	0.20	0.20	81	1 / 13	COPEC
VOC	1,1,1,2-Tetrachloroethane	µg/L	50	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,1,1-Trichloroethane	µg/L	77	0	0.00	0.00	NA	6,240	ND	ND	ND	ND	ND	ND	ND	6,240	0 / 77	–
VOC	1,1,2,2-Tetrachloroethane	µg/L	77	0	0.00	0.00	NA	1,804	ND	ND	ND	ND	ND	ND	ND	1,804	0 / 77	–
VOC	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	46	4	0.09	8.70	NA	NA	0.4	2.6	1.2	0.8	0.9	NA	NA	NA	NA	–
VOC	1,1,2-Trichloroethane	µg/L	77	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,1-Dichloroethane	µg/L	77	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,1-Dichloroethene	µg/L	77	0	0.00	0.00	NA	44,800	ND	ND	ND	ND	ND	ND	ND	44,800	0 / 77	–
VOC	1,1-Dichloropropene	µg/L	14	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2,3-Trichlorobenzene	µg/L	22	1	0.05	4.55	NA	NA	0.77	0.77	0.8	0.8	NA	NA	NA	NA	NA	–
VOC	1,2,3-Trichloropropane	µg/L	50	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2,4-Trichlorobenzene	µg/L	77	3	0.04	3.90	NA	129	0.35	0.94	0.6	0.4	0.3	NA	0.00	129	0 / 77	–
VOC	1,2,4-Trimethylbenzene	µg/L	14	7	0.50	50.00	NA	NA	8	48	31.0	25.0	14.5	NA	NA	NA	NA	–
VOC	1,2-Dibromo-3-Chloropropane	µg/L	68	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2-Dibromoethane	µg/L	32	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2-Dichlorobenzene	µg/L	77	12	0.16	15.58	NA	129	0.17	100	50.0	57.5	28.8	NA	0.00	129	0 / 77	–
VOC	1,2-Dichloroethane	µg/L	77	0	0.00	0.00	NA	22,600	ND	ND	ND	ND	ND	ND	ND	22,600	0 / 77	–
VOC	1,2-Dichloroethene (Total)	µg/L	9	0	0.00	0.00	NA	44,800	ND	ND	ND	ND	ND	ND	ND	44,800	0 / 9	–
VOC	1,2-Dichloropropane	µg/L	77	0	0.00	0.00	NA	3,040	ND	ND	ND	ND	ND	ND	ND	3,040	0 / 77	–
VOC	1,3,5-Trimethylbenzene	µg/L	14	3	0.21	21.43	NA	NA	1.8	3.7	2.5	1.9	0.9	NA	NA	NA	NA	–
VOC	1,3-Dichlorobenzene	µg/L	77	12	0.16	15.58	NA	129	0.2	84	29.9	21.0	30.6	NA	0.00	129	0 / 77	–
VOC	1,3-Dichloropropane	µg/L	14	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,4-Dichlorobenzene	µg/L	77	13	0.17	16.88	NA	129	0.37	180	62.3	25.0	65.6	NA	0.23	129	3 / 77	COPEC
VOC	2,2-Dichloropropane	µg/L	14	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	2-Butanone	µg/L	33	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	2-Chlorotoluene	µg/L	14	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	2-Hexanone	µg/L	20	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	4-Chlorotoluene	µg/L	14	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	4-Methyl-2-Pentanone	µg/L	33	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Acetone	µg/L	34	4	0.12	11.76	NA	NA	16	120	58.8	49.5	44.7	NA	NA	NA	NA	–
VOC	Benzene	µg/L	77	4	0.05	5.19	NA	700	0.24	9	4.6	4.5	4.2	NA	0.00	700	0 / 77	–

TABLE 2-15: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, B-AQUIFER (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Detections/ Analyses	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Greater of Surface Water Criteria and HGAL	Frequency of Samples Above Criteria[1]	COPEC/ COEC
VOC	Bromobenzene	μg/L	50	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Bromochloromethane	μg/L	32	0	0.00	0.00	NA	6,400	ND	ND	ND	ND	ND	ND	ND	6,400	0 / 32	–
VOC	Bromodichloromethane	μg/L	77	0	0.00	0.00	NA	6,400	ND	ND	ND	ND	ND	ND	ND	6,400	0 / 77	–
VOC	Bromoform	μg/L	77	0	0.00	0.00	NA	6,400	ND	ND	ND	ND	ND	ND	ND	6,400	0 / 77	–
VOC	Bromomethane	μg/L	77	0	0.00	0.00	NA	6,400	ND	ND	ND	ND	ND	ND	ND	6,400	0 / 77	–
VOC	Carbon Disulfide	μg/L	41	4	0.10	9.76	NA	NA	0.25	6	2.8	2.5	2.1	NA	NA	NA	NA	–
VOC	Carbon Tetrachloride	μg/L	77	6	0.08	7.79	NA	6,400	0.31	11	5.0	5.2	3.4	NA	0.00	6,400	0 / 77	–
VOC	Chlorobenzene	μg/L	77	11	0.14	14.29	NA	129	0.1	1,000	365.2	300.0	405.2	NA	0.55	129	6 / 77	COPEC
VOC	Chloroethane	μg/L	77	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Chloroform	μg/L	77	17	0.22	22.08	NA	6,400	0.17	7.3	1.9	1.4	1.8	NA	0.00	6,400	0 / 77	–
VOC	Chloromethane	μg/L	77	0	0.00	0.00	NA	6,400	ND	ND	ND	ND	ND	ND	ND	6,400	0 / 77	–
VOC	cis-1,2-Dichloroethene	μg/L	68	17	0.25	25.00	NA	44,800	0.15	870	217.0	55.0	294.5	NA	0.00	44,800	0 / 68	–
VOC	cis-1,3-Dichloropropene	μg/L	77	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Cyclohexane	μg/L	8	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Dibromochloromethane	μg/L	77	0	0.00	0.00	NA	6,400	ND	ND	ND	ND	ND	ND	ND	6,400	0 / 77	–
VOC	Dibromomethane	μg/L	50	1	0.02	2.00	NA	NA	0.25	0.25	0.3	0.3	NA	NA	NA	NA	NA	–
VOC	Dichlorodifluoromethane	μg/L	58	3	0.05	5.17	NA	NA	0.28	0.6	0.4	0.3	0.1	NA	NA	NA	NA	–
VOC	Ethylbenzene	μg/L	77	6	0.08	7.79	NA	86	0.19	16	3.0	0.4	5.8	NA	0.00	86	0 / 77	–
VOC	Isopropylbenzene	μg/L	22	2	0.09	9.09	NA	NA	0.12	0.59	0.4	0.4	0.2	NA	NA	NA	NA	–
VOC	m,p-Xylenes	μg/L	10	2	0.20	20.00	NA	NA	0.74	2.1	1.4	1.4	0.7	NA	NA	NA	NA	–
VOC	Methyl Acetate	μg/L	8	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Methylcyclohexane	μg/L	8	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Methylene Chloride	μg/L	77	2	0.03	2.60	NA	6,400	0.66	21	10.8	10.8	10.2	NA	0.00	6,400	0 / 77	–
VOC	N-Butylbenzene	μg/L	14	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Naphthalene	μg/L	29	7	0.24	24.14	NA	470	2.6	42	21.9	19.0	11.3	NA	0.00	470	0 / 29	–
VOC	O-Xylene	μg/L	10	1	0.10	10.00	NA	NA	1.1	1.1	1.1	1.1	NA	NA	NA	NA	NA	–
VOC	Para-Isopropyl Toluene	μg/L	14	1	0.07	7.14	NA	NA	0.62	0.62	0.6	0.6	NA	NA	NA	NA	NA	–
VOC	Propylbenzene	μg/L	14	1	0.07	7.14	NA	NA	0.74	0.74	0.7	0.7	NA	NA	NA	NA	NA	–
VOC	Sec-Butylbenzene	μg/L	14	1	0.07	7.14	NA	NA	0.55	0.55	0.6	0.6	NA	NA	NA	NA	NA	–
VOC	Styrene	μg/L	41	1	0.02	2.44	NA	NA	0.8	0.8	0.8	0.8	NA	NA	NA	NA	NA	–
VOC	Tert-Butyl Methyl Ether	μg/L	68	0	0.00	0.00	NA	8,000	ND	ND	ND	ND	ND	ND	ND	8,000	0 / 68	–
VOC	Tert-Butylbenzene	μg/L	14	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Tetrachloroethene	μg/L	77	12	0.16	15.58	NA	450	1.7	55	12.2	2.8	18.6	NA	0.00	450	0 / 77	–
VOC	Toluene	μg/L	77	3	0.04	3.90	NA	5,000	0.2	0.87	0.6	0.6	0.3	NA	0.00	5,000	0 / 77	–
VOC	Total LMW PAH	μg/L	29	7	0.24	24.14	NA	NA	5.2	84	43.9	38.0	22.5	NA	NA	NA	NA	–
VOC	Total PAH	μg/L	29	7	0.24	24.14	NA	NA	5.2	84	43.9	38.0	22.5	NA	NA	NA	NA	–
VOC	trans-1,2-Dichloroethene	μg/L	68	2	0.03	2.94	NA	44,800	0.52	0.83	0.7	0.7	0.2	NA	0.00	44,800	0 / 68	–
VOC	trans-1,3-Dichloropropene	μg/L	77	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Trichloroethene	μg/L	77	23	0.30	29.87	NA	400	0.2	28	6.1	3.5	7.0	NA	0.00	400	0 / 77	–
VOC	Trichlorofluoromethane	μg/L	58	10	0.17	17.24	NA	NA	0.14	16	5.1	1.8	6.1	NA	NA	NA	NA	–
VOC	Vinyl Acetate	μg/L	2	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Vinyl Chloride	μg/L	77	13	0.17	16.88	NA	NA	0.29	84	33.6	34.0	29.8	NA	NA	NA	NA	–
VOC	Xylene (Total)	μg/L	67	6	0.09	8.96	NA	NA	0.57	31	6.9	2.2	10.9	NA	NA	NA	NA	–
SVOC	1,4-Dioxane	μg/L	3	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,2'-Oxybis(1-Chloropropane)	μg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,4,5-Trichlorophenol	μg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,4,6-Trichlorophenol	μg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,4-Dichlorophenol	μg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,4-Dimethylphenol	μg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,4-Dinitrophenol	μg/L	15	0	0.00	0.00	NA	46	ND	ND	ND	ND	ND	ND	ND	46	0 / 15	–
SVOC	2,4-Dinitrotoluene	μg/L	15	0	0.00	0.00	NA	118	ND	ND	ND	ND	ND	ND	ND	118	0 / 15	–
SVOC	2,6-Dinitrotoluene	μg/L	15	0	0.00	0.00	NA	118	ND	ND	ND	ND	ND	ND	ND	118	0 / 15	–
SVOC	2-Chloronaphthalene	μg/L	15	0	0.00	0.00	NA	1.5	ND	ND	ND	ND	ND	ND	ND	1.5	0 / 15	–
SVOC	2-Chlorophenol	μg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2-Methylnaphthalene	μg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–

TABLE 2-15: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, B-AQUIFER (CONTINUED)

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Detections/ Analyses	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Greater of Surface Water Criteria and HGAL	Frequency of Samples Above Criteria[1]	COPEC/ COEC
SVOC	2-Methylphenol	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2-Nitroaniline	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2-Nitrophenol	µg/L	15	0	0.00	0.00	NA	970	ND	ND	ND	ND	ND	ND	ND	970	0 / 15	–
SVOC	3,3'-Dichlorobenzidine	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	3-Nitroaniline	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4,6-Dinitro-2-Methylphenol	µg/L	15	0	0.00	0.00	NA	970	ND	ND	ND	ND	ND	ND	ND	970	0 / 15	–
SVOC	4-Bromophenyl-Phenylether	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Chloro-3-Methylphenol	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Chloroaniline	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Chlorophenyl-Phenylether	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Methylphenol	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Nitroaniline	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Nitrophenol	µg/L	15	0	0.00	0.00	NA	970	ND	ND	ND	ND	ND	ND	ND	970	0 / 15	–
SVOC	Acenaphthene	µg/L	15	0	0.00	0.00	NA	710	ND	ND	ND	ND	ND	ND	ND	710	0 / 15	–
SVOC	Acenaphthylene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Anthracene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Benzo(a)anthracene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Benzo(a)pyrene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Benzo(b)fluoranthene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Benzo(g,h,i)perylene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Benzo(k)fluoranthene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Benzoic Acid	µg/L	6	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Benzyl Alcohol	µg/L	6	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Bis(2-chloroethoxy)methane	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Bis(2-chloroethyl)ether	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Bis(2-ethylhexyl)phthalate	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Butylbenzylphthalate	µg/L	15	0	0.00	0.00	NA	588.8	ND	ND	ND	ND	ND	ND	ND	588.8	0 / 15	–
SVOC	Carbazole	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Chrysene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Di-N-Butylphthalate	µg/L	15	0	0.00	0.00	NA	588.8	ND	ND	ND	ND	ND	ND	ND	588.8	0 / 15	–
SVOC	Di-N-Octylphthalate	µg/L	15	0	0.00	0.00	NA	588.8	ND	ND	ND	ND	ND	ND	ND	588.8	0 / 15	–
SVOC	Dibenz(a,h)anthracene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Dibenzofuran	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Diethylphthalate	µg/L	15	0	0.00	0.00	NA	588.8	ND	ND	ND	ND	ND	ND	ND	588.8	0 / 15	–
SVOC	Dimethylphthalate	µg/L	15	0	0.00	0.00	NA	3.4	ND	ND	ND	ND	ND	ND	ND	3.4	0 / 15	–
SVOC	Fluoranthene	µg/L	15	1	0.07	6.67	NA	16	1	1	1.0	1.0	NA	NA	0.00	16	0 / 15	–
SVOC	Fluorene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Hexachlorobenzene	µg/L	15	0	0.00	0.00	NA	129	ND	ND	ND	ND	ND	ND	ND	129	0 / 15	–
SVOC	Hexachlorobutadiene	µg/L	29	0	0.00	0.00	NA	6.4	ND	ND	ND	ND	ND	ND	ND	6.4	0 / 29	–
SVOC	Hexachlorocyclopentadiene	µg/L	15	0	0.00	0.00	NA	1.4	ND	ND	ND	ND	ND	ND	ND	1.4	0 / 15	–
SVOC	Hexachloroethane	µg/L	15	0	0.00	0.00	NA	188	ND	ND	ND	ND	ND	ND	ND	188	0 / 15	–
SVOC	Indeno(1,2,3-cd)pyrene	µg/L	15	0	0.00	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 15	–
SVOC	Isophorone	µg/L	15	0	0.00	0.00	NA	2,580	ND	ND	ND	ND	ND	ND	ND	2,580	0 / 15	–
SVOC	n-Nitroso-Di-N-Propylamine	µg/L	15	0	0.00	0.00	NA	660,000	ND	ND	ND	ND	ND	ND	ND	660,000	0 / 15	–
SVOC	n-Nitrosodimethylamine	µg/L	6	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	n-Nitrosodiphenylamine	µg/L	15	0	0.00	0.00	NA	660,000	ND	ND	ND	ND	ND	ND	ND	660,000	0 / 15	–
SVOC	Nitrobenzene	µg/L	15	0	0.00	0.00	NA	1,336	ND	ND	ND	ND	ND	ND	ND	1,336	0 / 15	–
SVOC	Pentachlorophenol	µg/L	15	0	0.00	0.00	NA	7.9	ND	ND	ND	ND	ND	ND	ND	7.9	0 / 15	–
SVOC	Phenanthrene	µg/L	15	1	0.07	6.67	NA	60	0.8	0.8	0.8	0.8	NA	NA	0.00	60	0 / 15	–
SVOC	Phenol	µg/L	15	0	0.00	0.00	NA	1,160	ND	ND	ND	ND	ND	ND	ND	1,160	0 / 15	–
SVOC	Pyrene	µg/L	15	1	0.07	6.67	NA	60	1	1	1.0	1.0	NA	NA	0.00	60	0 / 15	–
SVOC	Total Chlordane	µg/L	15	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Total HMW PAH	µg/L	15	1	0.07	6.67	NA	NA	82	82	82.0	82.0	NA	NA	NA	NA	NA	–
SVOC	Total LMW PAH	µg/L	15	1	0.07	6.67	NA	NA	43.6	43.6	43.6	43.6	NA	NA	NA	NA	NA	–
SVOC	Total PAH	µg/L	15	1	0.07	6.67	NA	NA	125.6	125.6	125.6	125.6	NA	NA	NA	NA	NA	–

TABLE 2-15: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, B-AQUIFER (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Detections/ Analyses	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Greater of Surface Water Criteria and HGAL	Frequency of Samples Above Criteria[1]	COPEC/ COEC
PEST	4,4'-DDD	µg/L	9	0	0.00	0.00	NA	0.72	ND	ND	ND	ND	ND	ND	ND	0.72	0 / 9	–
PEST	4,4'-DDE	µg/L	9	0	0.00	0.00	NA	2.8	ND	ND	ND	ND	ND	ND	ND	2.8	0 / 9	–
PEST	4,4'-DDT	µg/L	9	0	0.00	0.00	NA	0.001	ND	ND	ND	ND	ND	ND	ND	0.001	0 / 9	–
PEST	Aldrin	µg/L	9	0	0.00	0.00	NA	0.26	ND	ND	ND	ND	ND	ND	ND	0.26	0 / 9	–
PEST	alpha-BHC	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	alpha-Chlordane	µg/L	9	0	0.00	0.00	NA	0.004	ND	ND	ND	ND	ND	ND	ND	0.004	0 / 9	–
PEST	beta-BHC	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	delta-BHC	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	Dieldrin	µg/L	9	0	0.00	0.00	NA	0.142	ND	ND	ND	ND	ND	ND	ND	0.142	0 / 9	–
PEST	Endosulfan I	µg/L	9	0	0.00	0.00	NA	0.0087	ND	ND	ND	ND	ND	ND	ND	0.0087	0 / 9	–
PEST	Endosulfan II	µg/L	9	0	0.00	0.00	NA	0.0087	ND	ND	ND	ND	ND	ND	ND	0.0087	0 / 9	–
PEST	Endosulfan Sulfate	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	Endrin	µg/L	9	0	0.00	0.00	NA	0.0023	ND	ND	ND	ND	ND	ND	ND	0.0023	0 / 9	–
PEST	Endrin Aldehyde	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	Endrin Ketone	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	Gamma-Bhc (Lindane)	µg/L	9	0	0.00	0.00	NA	0.032	ND	ND	ND	ND	ND	ND	ND	0.032	0 / 9	–
PEST	Gamma-Chlordane	µg/L	9	0	0.00	0.00	NA	0.004	ND	ND	ND	ND	ND	ND	ND	0.004	0 / 9	–
PEST	Heptachlor	µg/L	9	0	0.00	0.00	NA	0.0036	ND	ND	ND	ND	ND	ND	ND	0.0036	0 / 9	–
PEST	Heptachlor Epoxide	µg/L	9	0	0.00	0.00	NA	0.0036	ND	ND	ND	ND	ND	ND	ND	0.0036	0 / 9	–
PEST	Methoxychlor	µg/L	9	0	0.00	0.00	NA	0.003	ND	ND	ND	ND	ND	ND	ND	0.003	0 / 9	–
PEST	Total Chlordane	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	Total DDT	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	Toxaphene	µg/L	9	0	0.00	0.00	NA	0.0002	ND	ND	ND	ND	ND	ND	ND	0.0002	0 / 9	–
PCB	Aroclor-1016	µg/L	9	0	0.00	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 9	–
PCB	Aroclor-1221	µg/L	9	0	0.00	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 9	–
PCB	Aroclor-1232	µg/L	9	0	0.00	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 9	–
PCB	Aroclor-1242	µg/L	9	0	0.00	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 9	–
PCB	Aroclor-1248	µg/L	9	0	0.00	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 9	–
PCB	Aroclor-1254	µg/L	9	0	0.00	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 9	–
PCB	Aroclor-1260	µg/L	9	0	0.00	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 9	–
PCB	Total Aroclor	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SOLIDS	Total Dissolved Solids	µg/L	44	44	1.00	100.00	NA	NA	620,000	30,700,000	11,030,454.5	10,600,000	7,675,598.6	NA	NA	NA	NA	–
SOLIDS	Total Suspended Solids	µg/L	1	1	1.00	100.00	NA	NA	11,000	11,000	11,000	11,000	NA	NA	NA	NA	NA	–
TOC	Total Organic Carbon	µg/L	3	2	0.67	66.67	NA	NA	1,300	2,300	1,800	1,800	500.0	NA	NA	NA	NA	–
TPHEXT	Diesel-Range Organics	µg/L	28	8	0.29	28.57	NA	1,400	75	660	302.0	185.0	242.5	NA	0.00	1,400	0 / 28	–
TPHEXT	Motor Oil-Range Organics	µg/L	28	10	0.36	35.71	NA	1,400	22	900	241.5	86.5	271.8	NA	0.00	1,400	0 / 28	–
TPHPRG	Gasoline-Range Organics	µg/L	28	9	0.32	32.14	NA	1,400	24	420	167.3	60.0	166.0	NA	0.00	1,400	0 / 28	–
TRPH	TRPH	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
ALKALN	Bicarbonate Alkalinity	µg/L	9	9	1.00	100.00	NA	NA	250,000	1,090,000	480,222.2	428,000	230,326.2	NA	NA	NA	NA	–
ALKALN	Carbonate Alkalinity	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
ALKALN	Hydroxide Alkalinity	µg/L	9	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
ALKALN	Total Alkalinity	µg/L	10	10	1.00	100.00	NA	NA	250,000	1,090,000	481800.0	440,000	218,557.9	NA	NA	NA	NA	–
ANION	Chloride	µg/L	15	15	1.00	100.00	NA	NA	192,000	19,000,000	7,913,933.3	6,660,000	5,762,437.9	NA	NA	NA	NA	–
ANION	Fluoride	µg/L	3	1	0.33	33.33	NA	NA	160	160	160.0	160.0	NA	NA	NA	NA	NA	–
ANION	Nitrate As Nitrogen	µg/L	15	7	0.47	46.67	NA	NA	20	23,000	5,051.4	420.0	7,809.3	NA	NA	NA	NA	–
ANION	Nitrate/Nitrite As Nitrogen	µg/L	10	8	0.80	80.00	NA	NA	20	23,000	4,465	330.0	7,499.8	NA	NA	NA	NA	–
ANION	Nitrite As Nitrogen	µg/L	13	4	0.31	30.77	NA	NA	17	210	82.3	51.0	75.5	NA	NA	NA	NA	–
ANION	Orthophosphate	µg/L	5	1	0.20	20.00	NA	NA	26,700	26,700	26,700	26,700	NA	NA	NA	NA	NA	–
ANION	Sulfate	µg/L	15	15	1.00	100.00	NA	NA	37,200	1,810,000	616,080	343,000	550,174.2	NA	NA	NA	NA	–
CEC	Calcium	µg/L	1	1	1.00	100.00	NA	NA	98,000	98,000	98,000	98,000	NA	NA	NA	NA	NA	–
CEC	Iron	µg/L	1	1	1.00	100.00	2,380	NA	310	310	310.0	310.0	NA	0.00	NA	2,380	0 / 1	–
CEC	Magnesium	µg/L	1	1	1.00	100.00	1,440,000	NA	390,000	390,000	390,000	390,000	NA	0.00	NA	1,440,000	0 / 1	–
CEC	Potassium	µg/L	1	1	1.00	100.00	448,000	NA	34,000	34,000	34,000	34,000	NA	0.00	NA	448,000	0 / 1	–
CEC	Sodium	µg/L	1	1	1.00	100.00	9,242,000	NA	2,200,000	2,200,000	2,200,000	2,200,000	NA	0.00	NA	9,242,000	0 / 1	–
DGASES	Ethane	µg/L	1	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–

TABLE 2-15: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, B-AQUIFER (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Detections/ Analyses	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Greater of Surface Water Criteria and HGAL	Frequency of Samples Above Criteria[1]	COPEC/ COEC
DGASES	Ethene	µg/L	1	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
DGASES	Methane	µg/L	1	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
DO	Dissolved Oxygen	µg/L	17	17	1.00	100.00	NA	NA	40	6,670	2,269.4	1,380	2,148	NA	NA	NA	NA	–
DO	Downhole Dissolved Oxygen Bottom	µg/L	10	10	1.00	100.00	NA	NA	400	1,560	794.0	755.0	349.4	NA	NA	NA	NA	–
DO	Downhole Dissolved Oxygen Middle	µg/L	11	11	1.00	100.00	NA	NA	190	2,980	1,379.1	1,100	853.9	NA	NA	NA	NA	–
DO	Downhole Dissolved Oxygen Top	µg/L	10	10	1.00	100.00	NA	NA	740	5,280	2,255	1,740	1,366.4	NA	NA	NA	NA	–
FTK-METAL	Dissolved Iron (II)	µg/L	3	3	1.00	100.00	NA	NA	0	1,000	333.3	0.0	471.4	NA	NA	NA	NA	–
FTK-METAL	Dissolved Manganese (II)	µg/L	3	3	1.00	100.00	NA	NA	0	11,000	4,033.3	1,100	4,946.6	NA	NA	NA	NA	–
FTK-METAL	Total Iron (II)	µg/L	10	10	1.00	100.00	NA	NA	0	2,080	698.0	300.0	786.4	NA	NA	NA	NA	–
FTK-METAL	Total Manganese (II)	µg/L	9	9	1.00	100.00	NA	NA	0	11,000	3,118.9	600.0	4,296.2	NA	NA	NA	NA	–
MEE	Ethane	µg/L	16	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
MEE	Ethene	µg/L	16	0	0.00	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
MEE	Methane	µg/L	16	11	0.69	68.75	NA	NA	4	7,000	1,948.8	410.0	2,622.2	NA	NA	NA	NA	–

Notes:

1	Criteria is the surface water criteria or, in the case of metals, the greater of the HGAL and the surface water criteria.
–	Not identified as either a COPEC or a COEC
µg/L	Microgram per liter
ALKALIN	Alkalinity
BHC	Benzene hexachloride
CEC	Cation exchange capacity
CHROM	Chromium
COEC	Chemical of ecological concern
COPEC	Chemical of potential ecological concern
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
DGASES	Dissolved gases
DO	Dissolved oxygen
EPN	Ethoxy-(((4-nitrophenoxy)phenyl)phosphine) sulfide
FTK-METAL	Field test kit- metal
H2S	Hydrogen sulfide
HGAL	Hunters Point groundwater ambient level
HMW	High molecular weight
LMW	Low molecular weight
ND	Not detected
NA	Not applicable or not available
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEST	Pesticides
SVOC	Semivolatile organic compound
TOC	Total organic carbon
TPHEXT	Total petroleum hydrocarbons-extractables
TPHPRG	Total petroleum hydrocarbons-purgeables
TRPH	Total recoverable petroleum hydrocarbons
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compound

TABLE 2-16: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, F-WBZ
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Surface Water Criteria[1]	Frequency of Samples Above Criteria	COPEC/ COEC
CHROM	Chromium Vi	µg/L	26	13	50.00	NA	50	12	70	51	50	14	NA	0.46	50	6 / 26	COPEC
METAL	Aluminum	µg/L	39	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
METAL	Antimony	µg/L	39	4	10.26	43.26	NA	3.6	4.6	4	4	0	0.00	NA	43.26	0 / 39	–
METAL	Arsenic	µg/L	47	12	25.53	27.34	36	1.5	6.3	3	3	1	0.00	0.00	36	0 / 47	–
METAL	Barium	µg/L	39	33	84.62	504.2	NA	1.5	732	92	26	166	0.06	NA	504.2	2 / 39	–
METAL	Beryllium	µg/L	39	0	0.00	1.4	NA	ND	ND	ND	ND	ND	ND	ND	1.4	0 / 39	–
METAL	Cadmium	µg/L	39	1	2.56	5.08	8.8	3.4	3.4	3	3	NA	0.00	0.00	8.8	0 / 39	–
METAL	Calcium	µg/L	49	44	89.80	NA	NA	3,090	285,000	56,768	25,200	69,086	NA	NA	NA	NA	–
METAL	Chromium	µg/L	49	33	67.35	15.66	400	3.2	76.2	38	36	26	0.70	0.00	400	0 / 49	-
METAL	Cobalt	µg/L	39	7	17.95	20.8	NA	0.71	3.4	2	1	1	0.00	NA	20.8	0 / 39	–
METAL	Copper	µg/L	39	10	25.64	28.04	3.1	1.2	12.1	4	3	3	0.00	0.70	28.04	0 / 39	–
METAL	Iron	µg/L	66	23	34.85	2,380	NA	15.6	5,980	886	238	1,360	0.09	NA	2,380	2 / 66	–
METAL	Lead	µg/L	39	0	0.00	14.44	5.6	ND	ND	ND	ND	ND	ND	ND	14.44	0 / 39	–
METAL	Magnesium	µg/L	49	49	100.00	1,440,000	NA	25,600	946,000	154,110	68,300	215,219	0.00	NA	1,440,000	0 / 49	–
METAL	Manganese	µg/L	48	26	54.17	8,140	NA	0.62	1,900	370	92	559	0.00	NA	8,140	0 / 48	–
METAL	Mercury	µg/L	51	6	11.76	0.6	0.025	0.16	0.87	0	0	0	0.17	1.00	0.6	1 / 51	COPEC
METAL	Molybdenum	µg/L	37	1	2.70	61.9	NA	7.6	7.6	8	8	NA	0.00	NA	61.9	0 / 37	–
METAL	Nickel	µg/L	39	8	20.51	96.48	8.2	1.2	11.6	6	6	4	0.00	0.25	96.48	0 / 39	–
METAL	Potassium	µg/L	49	37	75.51	448,000	NA	692	488,000	44,168	3,760	103,821	0.03	NA	448,000	1 / 49	–
METAL	Selenium	µg/L	39	2	5.13	14.5	71	5.7	8.3	7	7	1	0.00	0.00	71	0 / 39	–
METAL	Silver	µg/L	39	0	0.00	7.43	0.38	ND	ND	ND	ND	ND	ND	ND	7.43	0 / 39	–
METAL	Sodium	µg/L	49	48	97.96	9,242,000	NA	31,000	8,790,000	785,923	74,200	1,999,917	0.00	NA	9,242,000	0 / 49	–
METAL	Thallium	µg/L	38	4	10.53	12.97	426	1.7	3.3	2	2	1	0.00	0.00	426	0 / 38	–
METAL	Vanadium	µg/L	37	29	78.38	26.62	NA	0.69	21.3	6	3	6	0.00	NA	26.62	0 / 37	–
METAL	Zinc	µg/L	39	9	23.08	75.68	81	3.8	63.5	25	18	18	0.00	0.00	81	0 / 39	–
VOC	1,1,1,2-Tetrachloroethane	µg/L	56	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,1,1-Trichloroethane	µg/L	130	0	0.00	NA	6,240	ND	ND	ND	ND	ND	ND	ND	6,240	0 / 130	–
VOC	1,1,2,2-Tetrachloroethane	µg/L	130	0	0.00	NA	1,804	ND	ND	ND	ND	ND	ND	ND	1,804	0 / 130	–
VOC	1,1,2-Trichloro-1,2,2-Trifluoroethane	µg/L	68	5	7.35	NA	NA	0.6	2.6	1	1	1	NA	NA	NA	NA	–
VOC	1,1,2-Trichloroethane	µg/L	130	11	8.46	NA	NA	0.2	10	2	1	3	NA	NA	NA	NA	–
VOC	1,1-Dichloroethane	µg/L	130	4	3.08	NA	NA	1	4	2	2	1	NA	NA	NA	NA	–
VOC	1,1-Dichloroethene	µg/L	130	4	3.08	NA	44,800	0.4	6.2	2	1	2	NA	0.00	44,800	0 / 130	–
VOC	1,1-Dichloropropene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2,3-Trichlorobenzene	µg/L	46	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2,3-Trichloropropane	µg/L	56	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2,4-Trichlorobenzene	µg/L	130	1	0.77	NA	129	4.1	4.1	4	4	NA	NA	0.00	129	0 / 130	–
VOC	1,2,4-Trimethylbenzene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2-Dibromo-3-Chloropropane	µg/L	94	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2-Dibromoethane	µg/L	58	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,2-Dichlorobenzene	µg/L	132	3	2.27	NA	129	0.63	2.6	1	1	1	NA	0.00	129	0 / 132	–
VOC	1,2-Dichloroethane	µg/L	130	16	12.31	NA	22,600	0.2	170	34	1	53	NA	0.00	22,600	0 / 130	–
VOC	1,2-Dichloroethene (Total)	µg/L	34	0	0.00	NA	44,800	ND	ND	ND	ND	ND	ND	ND	44,800	0 / 34	–
VOC	1,2-Dichloropropane	µg/L	130	9	6.92	NA	3,040	0.2	3.8	1	0	1	NA	0.00	3,040	0 / 130	–
VOC	1,3,5-Trimethylbenzene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,3-Dichlorobenzene	µg/L	132	0	0.00	NA	129	ND	ND	ND	ND	ND	ND	ND	129	0 / 132	–
VOC	1,3-Dichloropropane	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	1,4-Dichlorobenzene	µg/L	132	5	3.79	NA	129	0.19	0.84	0	0	0	NA	0.00	129	0 / 132	–
VOC	2,2-Dichloropropane	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	2-Butanone	µg/L	81	2	2.47	NA	NA	2.1	36,000	18,001	18,001	17,999	NA	NA	NA	NA	–
VOC	2-Chloroethyl Vinyl Ether	µg/L	2	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	2-Chlorotoluene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	2-Hexanone	µg/L	66	1	1.52	NA	NA	0.4	0.4	0	0	NA	NA	NA	NA	NA	–
VOC	4-Chlorotoluene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	4-Methyl-2-Pentanone	µg/L	84	1	1.19	NA	NA	1,800	1,800	1,800	1,800	NA	NA	NA	NA	NA	–
VOC	Acetone	µg/L	80	6	7.50	NA	NA	4.2	220,000	36,757	81	81,949	NA	NA	NA	NA	–
VOC	Benzene	µg/L	130	6	4.62	NA	700	0.23	8,100	1,353	5	3,017	NA	0.17	700	1 / 130	COPEC
VOC	Bromobenzene	µg/L	56	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Bromochloromethane	µg/L	58	0	0.00	NA	6,400	ND	ND	ND	ND	ND	ND	ND	6,400	0 / 58	–

TABLE 2-16: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, F-WBZ (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Surface Water Criteria[1]	Frequency of Samples Above Criteria	COPEC/ COEC
VOC	Bromodichloromethane	µg/L	130	0	0.00	NA	6,400	ND	ND	ND	ND	ND	ND	ND	6,400	0 / 130	–
VOC	Bromoform	µg/L	130	1	0.77	NA	6,400	0.65	0.65	1	1	NA	NA	0.00	6,400	0 / 130	–
VOC	Bromomethane	µg/L	130	2	1.54	NA	6,400	0.2	0.4	0	0	0	NA	0.00	6,400	0 / 130	–
VOC	Carbon Disulfide	µg/L	92	4	4.35	NA	NA	0.2	25	7	1	11	NA	NA	NA	NA	–
VOC	Carbon Tetrachloride	µg/L	130	56	43.08	NA	6,400	0.26	200	19	4	35	NA	0.00	6,400	0 / 130	–
VOC	Chlorobenzene	µg/L	130	0	0.00	NA	129	ND	ND	ND	ND	ND	ND	ND	129	0 / 130	–
VOC	Chloroethane	µg/L	130	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Chloroform	µg/L	130	56	43.08	NA	6,400	0.2	500	48	7	103	NA	0.00	6,400	0 / 130	–
VOC	Chloromethane	µg/L	130	2	1.54	NA	6,400	0.3	0.5	0	0	0	NA	0.00	6,400	0 / 130	–
VOC	cis-1,2-Dichloroethene	µg/L	96	47	48.96	NA	44,800	0.16	620	45	6	129	NA	0.00	44,800	0 / 96	–
VOC	cis-1,3-Dichloropropene	µg/L	130	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Cyclohexane	µg/L	10	1	10.00	NA	NA	2.1	2.1	2	2	NA	NA	NA	NA	NA	–
VOC	Dibromochloromethane	µg/L	130	0	0.00	NA	6,400	ND	ND	ND	ND	ND	ND	ND	6,400	0 / 130	–
VOC	Dibromomethane	µg/L	56	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Dichlorodifluoromethane	µg/L	84	1	1.19	NA	NA	0.27	0.27	0	0	NA	NA	NA	NA	NA	–
VOC	Ethylbenzene	µg/L	130	2	1.54	NA	86	0.79	200	100	100	100	NA	0.50	86	1 / 130	COPEC
VOC	Isopropylbenzene	µg/L	46	3	6.52	NA	NA	0.12	1,100	367	0	518	NA	NA	NA	NA	–
VOC	m,p-Xylenes	µg/L	14	1	7.14	NA	NA	9.6	9.6	10	10	NA	NA	NA	NA	NA	–
VOC	Methyl Acetate	µg/L	10	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Methylcyclohexane	µg/L	10	1	10.00	NA	NA	0.59	0.59	1	1	NA	NA	NA	NA	NA	–
VOC	Methylene Chloride	µg/L	130	6	4.62	NA	6,400	6.8	1,200	217	17	440	NA	0.00	6,400	0 / 130	–
VOC	n-Butylbenzene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Naphthalene	µg/L	56	0	0.00	NA	470	ND	ND	ND	ND	ND	ND	ND	470	0 / 56	–
VOC	o-Xylene	µg/L	14	1	7.14	NA	NA	4.1	4.1	4	4	NA	NA	NA	NA	NA	–
VOC	Para-Isopropyl Toluene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Propylbenzene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Sec-Butylbenzene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Styrene	µg/L	92	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Tert-Butyl Methyl Ether	µg/L	93	1	1.08	NA	8,000	0.22	0.22	0	0	NA	NA	0.00	8,000	0 / 93	–
VOC	Tert-Butylbenzene	µg/L	20	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Tetrachloroethene	µg/L	130	15	11.54	NA	450	0.15	250	39	0	84	NA	0.00	450	0 / 130	–
VOC	Toluene	µg/L	130	5	3.85	NA	5,000	0.28	370	75	0	148	NA	0.00	5,000	0 / 130	–
VOC	Total LMW PAH	µg/L	56	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Total PAH	µg/L	56	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	trans-1,2-Dichloroethene	µg/L	96	11	11.46	NA	44,800	0.21	1.8	1	1	0	NA	0.00	44,800	0 / 96	–
VOC	trans-1,3-Dichloropropene	µg/L	130	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Trichloroethene	µg/L	130	64	49.23	NA	400	0.1	8,700	485	35	1,614	NA	0.19	400	12 / 130	COEC
VOC	Trichlorofluoromethane	µg/L	84	18	21.43	NA	NA	0.32	7.2	2	1	2	NA	NA	NA	NA	–
VOC	Vinyl Acetate	µg/L	4	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
VOC	Vinyl Chloride	µg/L	130	6	4.62	NA	NA	0.32	36	12	3	15	NA	NA	NA	NA	–
VOC	Xylene (Total)	µg/L	116	2	1.72	NA	NA	0.3	180	90	90	90	NA	NA	NA	NA	–
SVOC	2,2'-Oxybis(1-chloropropane)	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,4,5-Trichlorophenol	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,4,6-Trichlorophenol	µg/L	36	1	2.78	NA	NA	40	40	40	40	NA	NA	NA	NA	NA	–
SVOC	2,4-Dichlorophenol	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,4-Dimethylphenol	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2,4-Dinitrophenol	µg/L	35	0	0.00	NA	46	ND	ND	ND	ND	ND	ND	ND	46	0 / 35	–
SVOC	2,4-Dinitrotoluene	µg/L	36	0	0.00	NA	118	ND	ND	ND	ND	ND	ND	ND	118	0 / 36	–
SVOC	2,6-Dinitrotoluene	µg/L	36	0	0.00	NA	118	ND	ND	ND	ND	ND	ND	ND	118	0 / 36	–
SVOC	2-Chloronaphthalene	µg/L	36	0	0.00	NA	1.5	ND	ND	ND	ND	ND	ND	ND	1.5	0 / 36	–
SVOC	2-Chlorophenol	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2-Methylnaphthalene	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2-Methylphenol	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2-Nitroaniline	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	2-Nitrophenol	µg/L	36	0	0.00	NA	970	ND	ND	ND	ND	ND	ND	ND	970	0 / 36	–
SVOC	3,3'-Dichlorobenzidine	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	3-Nitroaniline	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4,6-Dinitro-2-Methylphenol	µg/L	35	0	0.00	NA	970	ND	ND	ND	ND	ND	ND	ND	970	0 / 35	–

TABLE 2-16: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, F-WBZ (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Surface Water Criteria[1]	Frequency of Samples Above Criteria	COPEC/ COEC
SVOC	4-Bromophenyl-Phenylether	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Chloro-3-Methylphenol	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Chloroaniline	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Chlorophenyl-Phenylether	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Methylphenol	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Nitroaniline	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	4-Nitrophenol	µg/L	36	0	0.00	NA	970	ND	ND	ND	ND	ND	ND	ND	970	0 / 36	–
SVOC	Acenaphthene	µg/L	36	0	0.00	NA	710	ND	ND	ND	ND	ND	ND	ND	710	0 / 36	–
SVOC	Acenaphthylene	µg/L	36	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 36	–
SVOC	Anthracene	µg/L	36	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 36	–
SVOC	Benzo(a)anthracene	µg/L	36	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 36	–
SVOC	Benzo(a)pyrene	µg/L	35	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 35	–
SVOC	Benzo(b)fluoranthene	µg/L	35	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 35	–
SVOC	Benzo(g,h,i)perylene	µg/L	35	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 35	–
SVOC	Benzo(k)fluoranthene	µg/L	35	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 35	–
SVOC	Bis(2-chloroethoxy)methane	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Bis(2-chloroethyl)ether	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Bis(2-ethylhexyl)phthalate	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Butylbenzylphthalate	µg/L	36	0	0.00	NA	588.8	ND	ND	ND	ND	ND	ND	ND	588.8	0 / 36	–
SVOC	Carbazole	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Chrysene	µg/L	36	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 36	–
SVOC	Di-N-Butylphthalate	µg/L	36	0	0.00	NA	588.8	ND	ND	ND	ND	ND	ND	ND	588.8	0 / 36	–
SVOC	Di-N-Octylphthalate	µg/L	35	0	0.00	NA	588.8	ND	ND	ND	ND	ND	ND	ND	588.8	0 / 35	–
SVOC	Dibenz(a,h)anthracene	µg/L	35	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 35	–
SVOC	Dibenzofuran	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Diethylphthalate	µg/L	36	0	0.00	NA	588.8	ND	ND	ND	ND	ND	ND	ND	588.8	0 / 36	–
SVOC	Dimethylphthalate	µg/L	36	0	0.00	NA	3.4	ND	ND	ND	ND	ND	ND	ND	3.4	0 / 36	–
SVOC	Fluoranthene	µg/L	36	0	0.00	NA	16	ND	ND	ND	ND	ND	ND	ND	16	0 / 36	–
SVOC	Fluorene	µg/L	36	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 36	–
SVOC	Hexachlorobenzene	µg/L	36	0	0.00	NA	129	ND	ND	ND	ND	ND	ND	ND	129	0 / 36	–
SVOC	Hexachlorobutadiene	µg/L	56	0	0.00	NA	6.4	ND	ND	ND	ND	ND	ND	ND	6.4	0 / 56	–
SVOC	Hexachlorocyclopentadiene	µg/L	36	0	0.00	NA	1.4	ND	ND	ND	ND	ND	ND	ND	1.4	0 / 36	–
SVOC	Hexachloroethane	µg/L	36	0	0.00	NA	188	ND	ND	ND	ND	ND	ND	ND	188	0 / 36	–
SVOC	Indeno(1,2,3-cd)pyrene	µg/L	35	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 35	–
SVOC	Isophorone	µg/L	36	0	0.00	NA	2,580	ND	ND	ND	ND	ND	ND	ND	2,580	0 / 36	–
SVOC	n-Nitroso-Di-N-Propylamine	µg/L	36	0	0.00	NA	660,000	ND	ND	ND	ND	ND	ND	ND	660,000	0 / 36	–
SVOC	n-Nitrosodiphenylamine	µg/L	36	0	0.00	NA	660,000	ND	ND	ND	ND	ND	ND	ND	660,000	0 / 36	–
SVOC	Nitrobenzene	µg/L	36	0	0.00	NA	1,336	ND	ND	ND	ND	ND	ND	ND	1,336	0 / 36	–
SVOC	Pentachlorophenol	µg/L	36	0	0.00	NA	7.9	ND	ND	ND	ND	ND	ND	ND	7.9	0 / 36	–
SVOC	Phenanthrene	µg/L	36	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 36	–
SVOC	Phenol	µg/L	36	0	0.00	NA	1,160	ND	ND	ND	ND	ND	ND	ND	1,160	0 / 36	–
SVOC	Pyrene	µg/L	36	0	0.00	NA	60	ND	ND	ND	ND	ND	ND	ND	60	0 / 36	–
SVOC	Total Chlordane	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Total HMW PAH	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Total LMW PAH	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
SVOC	Total PAH	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	4,4'-DDD	µg/L	41	0	0.00	NA	0.72	ND	ND	ND	ND	ND	ND	ND	0.72	0 / 41	–
PEST	4,4'-DDE	µg/L	41	0	0.00	NA	2.8	ND	ND	ND	ND	ND	ND	ND	2.8	0 / 41	–
PEST	4,4'-DDT	µg/L	41	0	0.00	NA	0.001	ND	ND	ND	ND	ND	ND	ND	0.001	0 / 41	–
PEST	Aldrin	µg/L	41	0	0.00	NA	0.26	ND	ND	ND	ND	ND	ND	ND	0.26	0 / 41	–
PEST	alpha-BHC	µg/L	41	1	2.44	NA	NA	0.08	0.08	0	0	NA	NA	NA	NA	NA	–
PEST	alpha-Chlordane	µg/L	41	0	0.00	NA	0.004	ND	ND	ND	ND	ND	ND	ND	0.004	0 / 41	–
PEST	beta-BHC	µg/L	41	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	delta-BHC	µg/L	41	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–
PEST	Dieldrin	µg/L	41	0	0.00	NA	0.142	ND	ND	ND	ND	ND	ND	ND	0.142	0 / 41	–
PEST	Endosulfan I	µg/L	41	0	0.00	NA	0.0087	ND	ND	ND	ND	ND	ND	ND	0.0087	0 / 41	–
PEST	Endosulfan II	µg/L	41	0	0.00	NA	0.0087	ND	ND	ND	ND	ND	ND	ND	0.0087	0 / 41	–
PEST	Endosulfan Sulfate	µg/L	41	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	–

TABLE 2-16: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, F-WBZ (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Surface Water Criteria[1]	Frequency of Samples Above Criteria	COPEC/ COEC
PEST	Endrin	µg/L	41	0	0.00	NA	0.0023	ND	ND	ND	ND	ND	ND	ND	0.0023	0 / 41	--
PEST	Endrin Aldehyde	µg/L	41	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
PEST	Endrin Ketone	µg/L	40	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
PEST	gamma-BHC (Lindane)	µg/L	41	0	0.00	NA	0.032	ND	ND	ND	ND	ND	ND	ND	0.032	0 / 41	--
PEST	gamma-Chlordane	µg/L	41	0	0.00	NA	0.004	ND	ND	ND	ND	ND	ND	ND	0.004	0 / 41	--
PEST	Heptachlor	µg/L	41	0	0.00	NA	0.0036	ND	ND	ND	ND	ND	ND	ND	0.0036	0 / 41	--
PEST	Heptachlor Epoxide	µg/L	40	1	2.50	NA	0.0036	0.03	0.03	0	0	NA	NA	1.00	0.0036	1 / 40	COPEC
PEST	Heptachlor Epoxide A	µg/L	1	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
PEST	Heptachlor Epoxide B	µg/L	1	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
PEST	Methoxychlor	µg/L	41	0	0.00	NA	0.003	ND	ND	ND	ND	ND	ND	ND	0.003	0 / 41	--
PEST	Total Chlordane	µg/L	41	1	2.44	NA	NA	0.21	0.21	0	0	NA	NA	NA	NA	NA	--
PEST	Total DDT	µg/L	41	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
PEST	Toxaphene	µg/L	41	0	0.00	NA	0.0002	ND	ND	ND	ND	ND	ND	ND	0.0002	0 / 41	--
PCB	Aroclor-1016	µg/L	36	0	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 36	--
PCB	Aroclor-1221	µg/L	36	0	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 36	--
PCB	Aroclor-1232	µg/L	36	0	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 36	--
PCB	Aroclor-1242	µg/L	36	0	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 36	--
PCB	Aroclor-1248	µg/L	36	0	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 36	--
PCB	Aroclor-1254	µg/L	36	0	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 36	--
PCB	Aroclor-1260	µg/L	36	0	0.00	NA	0.03	ND	ND	ND	ND	ND	ND	ND	0.03	0 / 36	--
PCB	Total Aroclor	µg/L	36	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
TPHEXT	Diesel-Range Organics	µg/L	54	9	16.67	NA	1,400	50	370	146	90	106	NA	0.00	1,400	0 / 54	--
TPHEXT	Motor Oil-Range Organics	µg/L	51	27	52.94	NA	1,400	46	1,400	395	340	303	NA	0.00	1,400	0 / 51	--
TPHPRG	Gasoline-Range Organics	µg/L	53	16	30.19	NA	1,400	10	3,300	435	52	960	NA	0.13	1,400	2 / 53	COPEC
TPHPRG	TPH-Purgeable Unknown Hydrocarbon	µg/L	2	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
TRPH	TRPH	µg/L	36	1	2.78	NA	NA	1,000	1,000	1,000	1,000	NA	NA	NA	NA	NA	--
SOLIDS	Total Dissolved Solids	µg/L	64	64	100.00	NA	NA	130,000	25,500,000	2,424,391	650,000	5,580,106	NA	NA	NA	NA	--
SOLIDS	Total Suspended Solids	µg/L	10	4	40.00	NA	NA	6,000	5,460,000	1,382,750	32,500	2,354,080	NA	NA	NA	NA	--
ALKALN	Alkalinity, Total (As Caco3)	µg/L	1	1	100.00	NA	NA	164,000	164,000	164,000	164,000	NA	NA	NA	NA	NA	--
ALKALN	Bicarbonate Alkalinity	µg/L	13	13	100.00	NA	NA	125,000	307,000	193,308	168,000	63,127	NA	NA	NA	NA	--
ALKALN	Carbonate	µg/L	1	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
ALKALN	Carbonate Alkalinity	µg/L	12	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
ALKALN	Hydroxide Alkalinity	µg/L	11	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
ALKALN	Hydroxide As Caco3	µg/L	1	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
ALKALN	Total Alkalinity	µg/L	31	31	100.00	NA	NA	49,000	307,000	142,387	125,000	66,854	NA	NA	NA	NA	--
ANION	Chloride	µg/L	47	47	100.00	NA	NA	54,500	14,000,000	891,060	195,000	2,187,763	NA	NA	NA	NA	--
ANION	Fluoride	µg/L	7	3	42.86	NA	NA	220	240	230	230	8	NA	NA	NA	NA	--
ANION	Nitrate As Nitrogen	µg/L	35	33	94.29	NA	NA	74	7,800	3,935	4,400	2,216	NA	NA	NA	NA	--
ANION	Nitrate/Nitrite As Nitrogen	µg/L	14	13	92.86	NA	NA	1,900	7,800	4,300	3,900	1,698	NA	NA	NA	NA	--
ANION	Nitrite As Nitrogen	µg/L	20	4	20.00	NA	NA	6	35	22	24	12	NA	NA	NA	NA	--
ANION	Orthophosphate	µg/L	16	9	56.25	NA	NA	75	300	185	210	74	NA	NA	NA	NA	--
ANION	Sulfate	µg/L	31	31	100.00	NA	NA	5,500	1,760,000	119,297	28,200	326,913	NA	NA	NA	NA	--
CEC	Calcium	µg/L	2	2	100.00	NA	NA	21,000	120,000	70,500	70,500	49,500	NA	NA	NA	NA	--
CEC	Iron	µg/L	2	0	0.00	2,380	NA	ND	ND	ND	ND	ND	ND	ND	2,380	0 / 2	--
CEC	Magnesium	µg/L	2	2	100.00	1,440,000	NA	50,000	210,000	130,000	130,000	80,000	0.00	NA	1,440,000	0 / 2	--
CEC	Potassium	µg/L	2	1	50.00	448,000	NA	48,000	48,000	48,000	48,000	NA	0.00	NA	448,000	0 / 2	--
CEC	Sodium	µg/L	2	2	100.00	9,242,000	NA	91,000	890,000	490,500	490,500	399,500	0.00	NA	9,242,000	0 / 2	--
DGASES	Ethane	µg/L	19	7	36.84	NA	NA	0.64	89	27	6	31	NA	NA	NA	NA	--
DGASES	Ethene	µg/L	19	4	21.05	NA	NA	1.1	49	29	33	17	NA	NA	NA	NA	--
DGASES	Hydrogen In Water	µg/L	16	1	6.25	NA	NA	27.6	27.6	28	28	NA	NA	NA	NA	NA	--
DGASES	Methane	µg/L	3	0	0.00	NA	NA	ND	ND	ND	ND	ND	ND	ND	NA	NA	--
DO	Dissolved Oxygen	µg/L	26	26	100.00	NA	NA	110	8,570	4,148	3,895	2,468	NA	NA	NA	NA	--
DO	Downhole Dissolved Oxygen Bottom	µg/L	16	16	100.00	NA	NA	250	5,300	2,947	3,780	1,833	NA	NA	NA	NA	--
DO	Downhole Dissolved Oxygen Middle	µg/L	19	19	100.00	NA	NA	470	8,500	3,537	4,030	2,056	NA	NA	NA	NA	--
DO	Downhole Dissolved Oxygen Top	µg/L	18	18	100.00	NA	NA	640	8,300	3,989	4,665	2,124	NA	NA	NA	NA	--
FTK-METAL	Dissolved Iron (II)	µg/L	3	3	100.00	NA	NA	0	2,000	667	0	943	NA	NA	NA	NA	--
FTK-METAL	Dissolved Manganese (II)	µg/L	4	4	100.00	NA	NA	0	5,300	2,325	2,000	2,250	NA	NA	NA	NA	--

TABLE 2-16: PARCEL-WIDE GROUNDWATER STATISTICS SUMMARY, F-WBZ (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Analytical Group	Chemical	Unit	Number of Analyses	Number of Detections	Percent Detections	HGAL	Surface Water Criteria	Minimum Detected Concentration	Maximum Detected Concentration	Average Detected Concentration	Median Detected Concentration	Standard Deviation Detected Concentration	Detects Greater than HGAL	Detects Greater than Surface Water Criteria	Surface Water Criteria[1]	Frequency of Samples Above Criteria	COPEC/ COEC
FTK-METAL	Total Iron (II)	µg/L	11	11	100.00	NA	NA	0	2,900	500	0	954	NA	NA	NA	NA	–
FTK-METAL	Total Manganese (II)	µg/L	9	9	100.00	NA	NA	0	6,100	1,700	700	2,304	NA	NA	NA	NA	–
HARD	Hardness	µg/L	1	1	100.00	NA	NA	230,000	230,000	230,000	230,000	NA	NA	NA	NA	NA	–
MEE	Ethane	µg/L	24	2	8.33	NA	NA	3.3	3.3	3	3	0	NA	NA	NA	NA	–
MEE	Ethene	µg/L	24	1	4.17	NA	NA	2.7	2.7	3	3	NA	NA	NA	NA	NA	–
MEE	Methane	µg/L	24	8	33.33	NA	NA	2.7	1,300	313	62	466	NA	NA	NA	NA	–

Notes:

1	Criteria is the surface water criteria or, in the case of metals, the greater of the HGAL and the surface water criteria.
–	Not identified as either a COPEC or a COEC
µg/L	Microgram per liter
ALKALIN	Alkalinity
BHC	Benzene hexachloride
CEC	Cation exchange capacity
CHROM	Chromium
COEC	Chemical of ecological concern
COPEC	Chemical of potential ecological concern
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDT	Dichlorodiphenyltrichloroethane
DGASES	Dissolved gases
DO	Dissolved oxygen
EPN	Ethoxy-(((4-nitrophenoxy)phenyl)phosphine) sulfide
FTK-METAL	Field test kit- metal
H2S	Hydrogen sulfide
F-WBZ	Bedrock water-bearing zone
HARD	Hardness
HGAL	Hunters Point groundwater ambient level
HMW	High molecular weight
LMW	Low molecular weight
MEE	Methane, ethane, and ethene
NA	Not applicable or not available
ND	Not detected
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PEST	Pesticides
SVOC	Semivolatile organic compound
TPH	Total petroleum hydrocarbons
TPHEXT	Total petroleum hydrocarbons-extractables
TPHPRG	Total petroleum hydrocarbons-purgeables
TRPH	Total recoverable petroleum hydrocarbons
VOC	Volatile organic compound

TABLE 2-17: RU GROUNDWATER STATISTICS SUMMARY
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

RU Background	Chemical of Concern	Number of Analyses	Percent Detections	Parcel C Residential RBC Vapor Intrusion	Parcel C Industrial RBC Vapor Intrusion[1]	Minimum Detected Concentration[1]	Maximum Detected Concentration[1]	Location(s) for Maximum Detected Concentration	Percent Detects Greater than Parcel C Residential RBC Vapor Intrusion	Percent Detects Greater than Parcel C Industrial RBC Vapor Intrusion	Chemicals of Ecological Concern
RU-1											
Features: Buildings 211, 218, 219, 231, 253	1,1-Dichloroethane	243	8.64	6.5	11	0.19	38	IR28MW916A (23-JAN-2001)	38.10%	38.10%	
	1,2-Dichloroethene (Total)	68	44.12	210	210	0.3	1,600	IR28MW136A (08-JUN-1994)	30.00%	30.00%	Chromium VI and zinc
	1,4-Dichlorobenzene	243	11.11	2.1	3.6	0.13	31	IR28MW126A (18-JUN-2002)	62.96%	48.15%	
	Benzene	243	29.63	0.5	0.63	0.13	37	IR28MW128A (13-JUN-1995)	87.50%	77.78%	
Redevelopment Blocks: COS-2, COS-3, 22, 24, 25	Chloroform	243	12.35	0.7	1.2	0.19	73	IR28MW171A (09-JUN-1995)	76.67%	50.00%	
	cis-1,2-Dichloroethene	175	74.29	210	210	0.16	2,400	IR28MW151A (17-JAN-2002)	30.00%	30.00%	
	Naphthalene	140	7.14	3.6	6	1	42	PA28MW51A (15-JUN-1995)	60.00%	40.00%	
	Tetrachloroethene	243	43.21	0.5	0.9	0.1	380	IR28MW127A (23-MAY-1994, 21-FEB-2001)	79.05%	69.52%	
	Trichloroethene	243	62.55	2.9	4.8	0.12	1,400	IR28MW151A (17-JAN-2002)	76.32%	66.45%	
	Vinyl Chloride	243	50.62	0.5	0.048	0.29	1,000	IR28MW151A (17-JAN-2002)	100.00%	100.00%	
RU-2											
Features: Buildings 251, 252, 258	1,1,2,2-Tetrachloroethane	143	0.7	3	5.1	6	6	IR58MW31A (20-JUN-1995)	100.00%	100.00%	None
	1,2,4-Trimethylbenzene	32	53.13	25	25	1.8	220	IR28MW909A (08-FEB-2001, 12-FEB-2001)	52.94%	52.94%	
	1,2-Dichloroethene (Total)	36	50	210	210	0.3	7,500	IR58MW31A (30-JUN-1994)	33.33%	33.33%	
	1,2-Dichloropropane	143	0.7	1.1	1.8	6	6	IR58MW33B (23-MAY-1996)	100.00%	100.00%	
Redevelopment Blocks: 20A, 20B	1,3,5-Trimethylbenzene	32	18.75	19	19	1	28	IR28MW909A (24-JAN-2001)	16.67%	16.67%	
	1,4-Dichlorobenzene	143	41.96	2.1	3.6	0.12	940	IR28MW909A (08-FEB-2001)	75.00%	71.67%	
	Benzene	143	21.68	0.5	0.63	0.2	64	IR28MW909A (08-FEB-2001)	80.65%	77.42%	
	Bromodichloromethane	143	2.8	1	1.7	0.15	5	IR58MW33B (23-MAY-1996)	50.00%	50.00%	
	Carbon Tetrachloride	143	20.98	0.5	0.077	0.16	46	IR28MW188F (08-JUN-2004)	100.00%	100.00%	
	Chlorobenzene	143	35.66	390	390	0.73	9,900	IR28MW909A (08-FEB-2001)	31.37%	31.37%	
	Chloroethane	142	5.63	6.5	11	2.2	15	IR58MW31A (11-AUG-2000, 15-AUG-2002)	50.00%	25.00%	
	Chloroform	143	39.16	0.7	1.2	0.32	100	IR28MW217A (04-AUG-2000)	78.57%	62.50%	
	cis-1,2-Dichloroethene	107	71.03	210	210	0.16	3,600	IR58MW31A (23-JAN-1998)	21.05%	21.05%	
	cis-1,3-Dichloropropene	143	0.7	0.5	0.36	4	4	IR58MW33B (23-MAY-1996)	100.00%	100.00%	
	Dibromochloromethane	143	1.4	2.6	4.4	0.2	3	IR58MW33B (23-MAY-1996)	50.00%	0.00%	
	Isopropylbenzene	45	22.22	7.8	7.8	0.9	15	IR28MW909A (24-JAN-2001)	10.00%	10.00%	
	Methylene Chloride	143	4.2	27	46	0.3	74	IR58MW31A (15-FEB-2001)	50.00%	16.67%	
	Naphthalene	68	26.47	3.6	6	0.77	150	IR28MW909A (08-FEB-2001)	88.89%	83.33%	
	Tetrachloroethene	143	54.55	0.5	0.9	0.13	31	IR58MW32B (23-FEB-2001)	71.79%	61.54%	
	trans-1,3-Dichloropropene	143	0.7	0.5	0.36	3	3	IR58MW33B (23-MAY-1996)	100.00%	100.00%	
	Trichloroethene	143	72.73	2.9	4.8	0.18	40	IR28MW300F (01-MAR-1996), IR28MW911A (08-FEB-2001)	53.85%	32.69%	
	Trichlorofluoromethane	81	54.32	180	180	0.24	400	IR28MW188F (13-SEP-2004)	9.09%	9.09%	
	Vinyl Chloride	143	37.76	0.5	0.048	0.28	1,700	IR58MW31A (10-SEP-2004)	100.00%	100.00%	
RU-4											
Features: Buildings 203, S-211, 215, 217, 228, 229, 230, 241, 270, 271, 272, 273, 275, 280, 281	1,1,2,2-Tetrachloroethane	247	0.4	3	3	120	120	IR28MW211F (13-NOV-2002)	100.00%	100.00%	None
	1,1,2-Trichloroethane	247	13.36	4	4	0.2	170	IR28MW211F (09-JUL-2002)	42.42%	42.42%	
	1,2,3-Trichloropropane	100	2	0.5	0.3	1.5	16	IR28MW934F2 (06-MAR-2001)	100.00%	100.00%	
	1,2-Dichloroethane	263	15.97	2.3	2.3	0.17	150	IR28MW409 (04-SEP-2003)	83.33%	73.81%	
Redevelopment Blocks: COS-3, 18, 23, 24, 26	1,2-Dichloropropane	247	7.69	1.1	1.1	0.2	3.9	IR28MW211F (10-APR-2001)	26.32%	15.79%	
	1,4-Dichlorobenzene	244	6.15	2.1	2.1	0.19	50	IR28MW407 (07-SEP-2004)	33.33%	33.33%	
	Benzene	247	12.96	0.5	0.37	0.1	6.4	IR30MW04F (12-JUL-2002)	68.75%	43.75%	
	Carbon Tetrachloride	263	24.71	0.5	0.046	0.15	520	IR28MW937F (02-APR-2001)	100.00%	100.00%	
	Chloroform	263	52.09	0.7	0.7	0.09	1,000	IR28MW937F (02-APR-2001)	85.40%	77.37%	
	cis-1,3-Dichloropropene	247	0.4	0.5	0.21	0.54	0.54	IR28MW312F (02-DEC-2004)	100.00%	100.00%	
	Methylene Chloride	247	5.26	27	27	0.75	270	IR28MW936F (05-APR-2001)	30.77%	7.69%	
	Naphthalene	115	5.22	3.6	3.6	1.7	42	IR29MW56F (11-AUG-1994)	83.33%	50.00%	
	Tetrachloroethene	263	24.33	0.5	0.54	0.15	260	IR28MW407 (02-SEP-2003)	70.31%	62.50%	
	Trichloroethene	262	71.37	2.9	2.9	0.16	76,000	IR28MW211F (13-NOV-2002)	89.84%	86.63%	
	Vinyl Chloride	263	10.65	0.5	0.028	0.3	440	IR28MW407 (02-SEP-2003)	100.00%	100.00%	

TABLE 2-17: RU GROUNDWATER STATISTICS SUMMARY (CONTINUED)
Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

RU Background	Chemical of Concern	Number of Analyses	Percent Detections	Parcel C Residential RBC Vapor Intrusion	Parcel C Industrial RBC Vapor Intrusion[1]	Minimum Detected Concentration[1]	Maximum Detected Concentration[1]	Location(s) for Maximum Detected Concentration	Percent Detects Greater than Parcel C Residential RBC Vapor Intrusion	Percent Detects Greater than Parcel C Industrial RBC Vapor Intrusion	Chemicals of Ecological Concern
RU-5											
Features: Building 134	1,2,4-Trimethylbenzene	50	14	25	25	3.4	93	IR25MW19A (22-JAN-2001)	28.57%	28.57%	Chromium VI
	1,2-Dichlorobenzene	347	27.38	2600	2,600	0.27	62,000	IR25MW15A1 (14-JUN-1994)	42.11%	42.11%	
	1,2-Dichloroethane	349	22.64	2.3	2.3	0.3	150,000	IR25MW15A1 (26-MAY-1995)	81.01%	77.22%	
	1,2-Dichloroethene (Total)	81	33.33	210	210	1	57,000	IR25MW15A1 (11-AUG-1994)	29.63%	29.63%	
Redevelopment Blocks: 10, 11	1,2-Dichloropropane	349	5.16	1.1	1.1	2	350	IR25MW19A (29-JAN-1998)	100.00%	100.00%	
	1,3,5-Trimethylbenzene	50	8	19	19	0.79	22	IR25MW15A1 (11-JAN-2001)	25.00%	25.00%	
	1,4-Dichlorobenzene	346	21.1	2.1	2.1	0.22	15,000	IR25MW19A (29-JAN-1998)	82.19%	79.45%	
	Benzene	358	24.58	0.5	0.37	0.12	400	IR25MW19A (22-JAN-2001)	89.77%	88.64%	
	Bromodichloromethane	349	0.86	1	1	5.6	130	IR25MW19A (22-JAN-2001)	100.00%	100.00%	
	Chlorobenzene	349	11.75	390	390	0.22	2,300	IR25MW15A1 (11-JAN-2001)	21.95%	21.95%	
	Chloroethane	349	3.44	6.5	6.5	1	81	IR06MW30A (23-AUG-1994)	91.67%	91.67%	
	Chloroform	349	4.58	0.7	0.7	0.2	39	IR25MW15A1 (26-MAY-1995)	75.00%	56.25%	
	cis-1,2-Dichloroethene	268	45.15	210	210	0.16	58,000	IR25MW15A1 (05-FEB-1998)	42.15%	42.15%	
	Methylene Chloride	349	2.58	27	27	0.4	200	IR25MW15A1 (26-MAY-1995)	44.44%	44.44%	
	Naphthalene	231	29.87	3.6	3.6	0.06	1,800	IR06MW42A (10-JAN-1992)	85.51%	81.16%	
	Tetrachloroethene	349	22.64	0.5	0.54	0.18	72,000	IR25MW19A (29-JAN-1998, 22-JAN-2001)	94.94%	93.67%	
	trans-1,2-Dichloroethene	268	22.01	180	180	0.14	2,400	IR25MW19A (22-JAN-2001)	23.73%	23.73%	
	Trichloroethene	349	36.1	2.9	2.9	0.18	18,000	IR25MW19A (22-JAN-2001)	76.98%	67.46%	
	Trichlorofluoromethane	225	8	180	180	0.25	5,900	IR25MW52A (17-JUN-2002)	22.22%	22.22%	
	Vinyl Chloride	349	31.81	0.5	0.028	0.4	6,600	IR25MW15A1 (05-OCT-1995)	100.00%	100.00%	

Notes:

1 All units in micrograms per liter

RBC Risk-based concentration
RU Remedial Unit

TABLE 2-18: RU-C5 SUMMARY STATISTICS FOR COCs FOR DOMESTIC USE EXPOSURE

Feasibility Study Report for Parcel C, Hunters Point Shipyard, San Francisco, California

Chemical of Potential Concern	Units	Minimum Concentration (Qualifier)		Maximum Concentration (Qualifier)		Location of Maximum	Detection Frequency
1,1-DICHLOROETHANE	µg/L	1.70E-01	J	8.00E+00	J	IR06MW59A1	10 / 284
1,2,4-TRICHLOROBENZENE	µg/L	4.50E-01		2.00E+02	J	IR25MW19A	22 / 280
1,2,4-TRIMETHYLBENZENE	µg/L	3.40E+00		9.30E+01		IR25MW19A	7 / 36
1,2-DICHLOROBENZENE	µg/L	2.70E-01	J	6.20E+04	J	IR25MW15A1	79 / 286
1,2-DICHLOROETHANE	µg/L	3.00E-01	J	1.50E+05		IR25MW15A1	59 / 284
1,2-DICHLOROETHENE (TOTAL)	µg/L	1.50E+00		5.70E+04		IR25MW15A1	25 / 79
1,2-DICHLOROPROPANE	µg/L	2.00E+00		3.50E+02	J	IR25MW19A	16 / 284
1,3,5-TRIMETHYLBENZENE	µg/L	7.90E-01		2.20E+01		IR25MW15A1	4 / 36
1,3-DICHLOROBENZENE	µg/L	2.10E-01		6.30E+02		IR25MW19A	20 / 286
1,4-DICHLOROBENZENE	µg/L	2.20E-01	J	1.50E+04		IR25MW19A	61 / 286
2,4-DIMETHYLPHENOL	µg/L	8.00E+00	J	1.60E+04		IR25MW15A1	18 / 150
2,4-DINITROTOLUENE	µg/L	4.90E+03	J	4.90E+03	J	IR25MW11A	1 / 161
2-METHYLNAPHTHALENE	µg/L	4.50E-01		9.20E+02	J	IR25MW11A	33 / 170
2-METHYLPHENOL	µg/L	3.50E-01		3.80E+03		IR25MW15A1	11 / 149
3,4-METHYLPHENOL	µg/L	3.80E+02		3.20E+03		IR25MW19A	2 / 12
4-METHYLPHENOL	µg/L	1.50E+00		9.10E+03		IR25MW15A1	12 / 138
ALDRIN	µg/L	8.50E-03		8.50E-03		IR25MW15A1	1 / 39
ALPHA-BHC	µg/L	1.45E-02		2.00E-02		IR25MW15A1	2 / 39
ANTIMONY	µg/L	2.10E+00		4.01E+01		IR06MW44A	15 / 101
ARSENIC	µg/L	1.50E+00		1.43E+01		IR06MW22AD	73 / 144
BENZENE	µg/L	1.20E-01	J	4.00E+02		IR25MW19A	78 / 288
BENZO(A)ANTHRACENE	µg/L	1.00E-02	J	3.10E+00		IR25MW22A	6 / 174
BENZO(A)PYRENE	µg/L	2.10E-01		2.10E-01		IR25MW19A	1 / 173
BIS(2-ETHYLHEXYL)PHTHALATE	µg/L	1.00E+00	J	3.20E+01		IR25MW22A	2 / 160
BROMODICHLOROMETHANE	µg/L	5.60E+00		1.30E+02		IR25MW19A	3 / 284
CARBAZOLE	µg/L	3.00E-01		7.50E+00		IR06MW42A	15 / 88
CHLOROBENZENE	µg/L	2.20E-01	J	2.30E+03		IR25MW15A1	37 / 284
CHLOROETHANE	µg/L	1.50E+01	J	8.10E+01		IR06MW30A	10 / 284
CHLOROFORM	µg/L	2.00E-01	J	3.90E+01	J	IR25MW15A1	15 / 284
CHROMIUM VI	µg/L	7.10E+00	J	1.15E+02		IR06MW49F	8 / 127
CHRYSENE	µg/L	1.50E-02		2.00E+02	J	IR25MW11A	4 / 175
CIS-1,2-DICHLOROETHENE	µg/L	1.60E-01	J	5.80E+04		IR25MW15A1	104 / 226
DIBENZOFURAN	µg/L	1.00E+00	J	3.30E+01		IR06MW42A	38 / 161
DIELDRIN	µg/L	5.50E-03		6.00E-02	J	IR25MW15A1	2 / 39
HEPTACHLOR EPOXIDE	µg/L	2.00E-03	J	3.00E-02	J	IR25MW15A1	3 / 37
HEPTACHLOR EPOXIDE A	µg/L	5.50E-02	J	5.50E-02	J	IR25MW15A1	1 / 2
HEXACHLOROETHANE	µg/L	7.00E+00		7.00E+00		IR25MW16A	1 / 160
IRON	µg/L	2.04E+01		5.50E+05		IR25MW19A	77 / 129
MANGANESE	µg/L	6.90E-01		1.04E+04		IR25MW19A	106 / 110
METHYLENE CHLORIDE	µg/L	3.00E-01		2.00E+02	J	IR25MW15A1	10 / 284
NAPHTHALENE	µg/L	5.50E-02		3.70E+02		IR25MW19A	52 / 198
PENTACHLOROPHENOL	µg/L	6.50E-01		6.10E+03	J	IR25MW11A	3 / 151
TETRACHLOROETHENE	µg/L	1.80E-01	J	7.20E+04		IR25MW19A	65 / 284
THALLIUM	µg/L	1.60E+00		5.27E+01		IR25MW17A	13 / 101
TRANS-1,2-DICHLOROETHENE	µg/L	1.40E-01	J	2.40E+03		IR25MW19A	52 / 226
TRICHLOROETHENE	µg/L	1.80E-01	J	1.80E+04		IR25MW19A	108 / 284
TRICHLOROFLUOROMETHANE	µg/L	2.50E-01	J	5.90E+03	J	IR25MW52A	17 / 192
VINYL CHLORIDE	µg/L	4.00E-01	J	6.60E+03		IR25MW15A1	97 / 284

Notes:

µg/L Microgram per liter
BHC Hexachlorocyclohexane
J Estimated concentration